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TINGITIDÆ FROM MALAYSIA AND MADAGASCAR (HEMIPTERA)

By C. J. DRAKE and M. E. POOR
Of Iowa State College, Ames

ONE PLATE

The present paper is based largely upon Tingitidæ from the Philippine Islands kindly presented to the writers by the late Charles Fuller Baker, of the University of the Philippines, and the Baker collection in the United States National Museum, Washington, D. C. It contains the descriptions of one new genus and sixteen new species, and notes on several other genera and species. Unless otherwise stated the types are in the Drake collection.

CANTACADER QUINQUECOSTATA (Fieber).

Tuphrostethus quinquecostatus FIEBER, Ent. Mon. (1844) 41, pl. 3, figs. 18–22.

Cantacader quinquecostata STÅL, Enum. Hemip. 3 (1873) 117; DISTANT, Fauna Brit. Ind., Rhynch. 2 (1904) 123, fig. 88.

Two specimens: Mount Maquiling, Laguna Province, Luzon, *C. F. Baker;* Cadiz, Occidental Negros Province, Negros, *W. D. Pierce.*

SERENTHIA VICINALIS Drake.

Serenthia vicinalis DRAKE, Philip. Journ. Sci. 34 (1927) 311.

Four specimens: Imugan, Nueva Vizcaya Province; Baguio, Benguet Subprovince; Mount Maquiling, Laguna Province, Luzon. Mount Maquiling is the type locality.

SERENTHIA SEDALIS Drake.

Serenthia sedalis DRAKE, Philip. Journ. Sci. 34 (1927) 312.

One specimen, Mount Maquiling, Laguna Province, Luzon. Manila is the type locality.

Genus PERISSONEMIA novum

Head very short, with five spines. Bucculæ broad, contiguous in front. Rostrum long, the channel widening posteriorly. Metasternal canal long, prominent. Antennæ long, rather stout, indistinctly pilose, not widely separated at base; segments I and II short; III very long; IV long. Pronotum narrowed in front, pitted, transversely convex, tricarinate; calli deeply impressed; paranota narrow, areolate; collar strongly raised, very prominent, areolate; triangular process areolate. Elytra considerably longer than abdomen, when at rest strongly overlapping and jointly rounded behind, divided into the usual areas, the discoidal area reaching beyond the middle of elytra. Wings present. Legs long, slender.

Type of genus, *Perissonemia torquata* sp. nov.

Allied to the South American genus *Telconemia* Costa, but distinguishable by the more slender antennæ, longer fourth antennal segment, deeply impressed anterior portion of pronotum, very strongly elevated and prominent collar, and differently formed paranota. The lateral carinæ in the genotype arise anteriorly on the disk or summit of the strongly swollen portion of pronotum.

The genus *Perissonemia* is here divided into two subgenera; namely, *Perissonemia* subgen. nov. (type, *torquata*) and *Ulonemia* subgen. nov. (type, *dignata*). In the former the hood is wanting, the collar strongly elevated and reticulate, the lateral carinæ short, and the outer row of areolæ on the anterior portion of the paranota with membranous margins (without marginal nervure). The subgenus *Ulonemia* is described below.

PERISSONEMIA (PERISSONEMIA) TORQUATA sp. nov. Plate 1.

Pronotum dark brown, slightly shiny, very strongly convex, coarsely pitted, indistinctly clothed with fine, short, golden hairs; collar lighter and subtruncate in front, very strongly raised. Median carina slightly more elevated in front, united with median nervure of collar, with one elongate cell behind collar. Lateral carinæ short, slightly converging posteriorly. Paranota peculiarly formed in front, there with the two inner areolæ bounded by a stout nervure and the three small outer areolæ with no distinct nervure along their membranous margins;

areolæ extremely small and indistinct on posterior portion. Elytra dark brown; costal area lighter, moderately broad, uniseriate, the areolæ large, hyaline, and iridescent; subcostal area triseriate in widest part. Pronotum and elytra with whitish exudation. Rostrum reaching slightly beyond middle of metasternum. Legs brown. Antennæ brown, segment I short, stouter and a little longer than II; III very long, twice as long as IV, the latter long.

Length, 3.25 mm; width, 1.85.

Holotype, male, Surigao, Mindanao (Drake collection); allotype, female, Butuan, Mindanao (U. S. Nat. Mus.); 2 paratypes taken with the allotype.

Subgenus ULONEMIA novum

Differs from the subgenus *Perissonemia* (type, *torquata*) in having long lateral carinæ, and differently formed paranota and collar. Hood present or absent. Paranota narrow, strongly reflexed and areolate, or only ridgelike and not areolate.

Subgenotype, *U. dignata* sp. nov.

PERISSONEMIA (ULONEMIA) DIGNATA sp. nov.

Moderately large, elongate, yellowish brown. Head dark ferruginous; spines very short, blunt, the median porrect. Eyes large, black, transverse. Buccule testaceous. Rostral channel deep, moderately widened posteriorly; rostrum reaching almost to end of channel, light brown, the tip dark; laminæ testaceous. Antennæ very long, rather slender, brown, somewhat shiny; segment I considerably stouter than, and nearly twice as long as, II; III practically straight, twice as long as IV, the latter long and more densely clothed with longer hairs.

Pronotum moderately convex, coarsely pitted, tricarinate, the disc pale brown; lateral carinæ long, converging posteriorly, slightly more raised and indistinctly areolate behind. Paranota narrow, very strongly reflexed, mostly biseriate, uniseriate behind. Collar strongly raised and reticulate, faintly convex at middle in front, slightly inflated and produced backward at middle so as to form a small oblique hood. Elytra testaceous, the areolæ hyaline; costal area uniseriate, the areolæ moderately large; subcostal area a little wider, almost entirely biseriate. Legs rather slender, brown.

Length, 3.05 mm; width, 1.

Holotype, male, allotype, female, Baguio, Benguet Subprovince, Luzon (Drake collection); 5 paratypes taken with the type (U. S. Nat. Mus.). One female, apparently the same species,

from Zamboanga, Mindanao. The color, shorter antennæ, and smaller hood separate this species from the new forms described below.

PERISSONEMIA (ULONEMIA) BORNEENSIS (Distant).

Teloonemia borneensis DISTANT, Rec. Ind. Mus. 3 (1909) 166, pl. 10, figs. 1, 1a.

Sandakan, Borneo, 11 specimens, *C. F. Baker*. The lateral carinæ are very sharply defined in some specimens, whereas in others they become almost obsolete. Certain specimens of the series agree perfectly with Distant's figure of the species. Six from Singapore, Straits Settlements, are slightly smaller and tend to have less-defined lateral carinæ, but they do not seem to differ enough to warrant a varietal description.

PERISSONEMIA (ULONEMIA) ILLUSTRIS sp. nov.

Small, slender, usually conspicuously marked with eight white spots (exudations). Head dark brown, convex above, the spines very short, stout, and pale brown. Antennæ moderately long; segment I rather long, slightly stouter, dark brown, and twice as long as II; III long, yellowish brown, two and one-half times as long as IV; IV slightly enlarged, dark brown. Body beneath dark brown, the sides with white exudation. Sternal laminæ widely separated and subparallel on meso- and metasternum, the rostrum extending to metasternum.

Pronotum very strongly convex, coarsely and deeply pitted, narrowed in front, tricarinate, brown to fuscous-brown, a white spot on each side in front and another on each side behind (exudations); median carina distinct; lateral carinæ faintly developed, becoming almost obsolete in front, strongly bowed inward behind disk, lateral margin indistinctly ridged. Elytra constricted beyond the middle, when in repose jointly rounded behind; brown, lighter behind, the apical margin fuscous; a spot on each side at base and another at apex of each discoidal area white (exudations); costal area very narrow, uniseriate; subcostal area wide, triseriate.

Length, 2.90 mm; width, 0.90.

Holotype, male, and allotype, female, Imugan, Nueva Vizcaya Province, Luzon (U. S. Nat. Mus.); paratypes, 6 males, taken with the type. In most of the specimens the elytra at the constriction behind are yellowish brown. The collar is distinctly raised but not so strongly as in *borneensis* Distant.

PERISSONEMIA (ULONEMIA) ELECTA sp. nov.

Elongate, slender, brown. Head dark reddish brown, the spines lighter, short, blunt. Eyes transverse, dark reddish brown. Antennal segment I about twice as long as, and much stouter than, II, the other segments wanting. Sternal laminæ testaceous, the channel deep and rather narrow, the rostrum yellowish brown and extending almost to end of sulcus. Body beneath brown. Legs slender, brown, the tips of tarsi dark. Wings longer than abdomen, slightly clouded.

Pronotum strongly convex, closely pitted, strongly narrowed in front, sharply tricarinate, the lateral carinæ distinctly converging posteriorly; all carinæ testaceous behind. Paranota very narrow, testaceous, strongly reflexed, biseriate in front, becoming narrower posteriorly, extremely narrow and nonreticulate opposite humeri. Posterior triangular projection reticulate. Hood small but very distinct, subtruncate in front, obliquely projecting posteriorly. Calli deeply impressed, dark brown. Elytra narrow, long, faintly constricted beyond middle; costal area narrow, uniseriate, the areolæ rather small, hyaline, and somewhat rectangular in outline; subcostal area narrower, biseriate, the areolæ very small; discoidal area long, extending beyond middle of elytra, narrowed at both base and apex, the outer boundary nearly straight, finely reticulate, widest near middle, there about six cells deep; sutural area more widely reticulate.

Length, 3.45 mm; width, 1.

Holotype, male, Baguio, Benguet Subprovince, Luzon.

This species is most closely allied to *Perissonemia dignatis* sp. nov., but readily separated from it by the narrow form, smaller hood, and very narrow posterior portion of the paranota. *Perissonemia assamensis* (Distant) has a much larger hood than either of the above species.

PERISSONEMIA (ULONEMIA) RECENTIS sp. nov.

Head brownish black, the eyes very large and black; median and anterior spines brown, very short, the posterior pair longer and yellowish. Bucculæ brown, contiguous in front, yellowish behind. Sternal laminæ yellowish, the channel deep, the rostrum reaching to metasternum. Body beneath dark brown, the legs yellowish brown. Antennal segment I short, stout, about twice as long as II, the latter slightly more slender; III long,

yellowish brown, slightly more than twice as long as IV; IV much darker, moderately incrassate.

Pronotum brown, the collar and part of carinæ and paranota testaceous; collar reticulate, only slightly elevated, faintly produced forward at middle. Paranota very narrow, testaceous and uniseriate in front, narrower and nonreticulate behind. Median carina mostly brown, slightly more elevated than lateral ones; lateral carinæ very distinct, slightly converging posteriorly. Elytra faintly constricted beyond the middle; costal area very narrow, uniseriate, the areolæ very small, testaceous, with a broad, transverse, fuscous band at middle; subcostal area narrow, testaceous, with fuscous band broader than in costal area, uniseriate in front and biseriate behind; discoidal area large, narrowed at both base and apex, impressed, with outer margin nearly straight; brown, the basal and apical parts testaceous; sutural area brown-fuscous. Wings longer than abdomen, clouded.

Length, 3.15 mm; width, 0.90.

Holotype, male, Singapore, Straits Settlements (U. S. Nat. Mus.); allotype, female, same locality (Drake collection). This species is somewhat atypical of the genus *Perissonemia*. The pronotum is broader in front and the collum not so strongly raised as in the other species described above. In addition to the above characters *recentis* is readily distinguished from the other members of the genus by the strikingly colored, bifasciate elytra. In the central portion of the darkened areas of the discoidal and apical portions of elytra some of the nervures are lighter.

Genus CYSTEOCHILA Stål, 1873

Logotype, *C. tingoides* (Motschulsky).

The genus *Cysteochila* Stål, Enum. Hemip. 3 (1873) 121 and 129, was erected for *Monanthia ? tingoides* Motschulsky, *M. (Physatocheila) sordida* Stål, and *C. caffra* Stål. The genera *Cysteochila* Stål and *Physatocheila* Stål are somewhat confused in the literature, and the characters employed by Stål for separating these two genera are rather weak. Distant, Fauna Brit. Ind. Rhynch. 2 (1904) 138, made *C. tingoides* (Motschulsky) the type of the genus *Cysteochila*. Bergroth, Revue Russe d'Entom. 17 (1917) 103 and 104, redescribed *C. tingoides* (Motschulsky) and made the genus *Bredenbachius* Distant a synonym of *Cysteochila*. He also disagree with Distant regarding the type of the

genus *Cysteochila* and stated that *sordida* must be regarded as the type.

The genus *Bredenbachius* Distant (type, *pictus* Distant) was erected for the intermediate forms of *Cysteochila* having one row of large areolæ in the costal area. Whether *Bredenbachius* should be treated as a genus or a subgenus or suppressed as a synonym of *Cysteochila* will depend upon the status of *C. tingoides* (Motschulsky). The writers have not seen examples of Motschulsky's species, but from the original description and the comments of Bergroth it would appear that *Cysteochila* with *tingoides* as genotype may include the species of *Bredenbachius*. Horvath, Arkiv för Zool. 17a (1925) 3, divides the genus *Cysteochila* Stål into the subgenera *Cysteochila* Horvath (type, *C. sordida* Stål) and *Parada* Horvath (type, *C. tæniophora* Horvath). The writers feel that *Parada* Horvath should be raised to generic rank; it may be separated from *Cysteochila* by the hood and strikingly different lateral carinæ. *Cysteochila elongata* Distant and *C. nexa* Distant from India are atypical of the genus *Cysteochila* and may represent a new genus.

CYSTEOCHILA PICTA (Distant).

Bredenbachius pictus DISTANT, Ann. Soc. Ent. Belg. 47 (1903) 50.

Four specimens from Mount Maquiling, Luzon, and 1 from Butuan, Mindanao. The writers are indebted to Mr. W. E. China for comparing a specimen from Mount Maquiling with Distant's type.

CYSTEOCHILA LECTA *sp. nov.*

Very similar to *C. picta* (Distant) in size, form, color, and marking, but readily separated from it by the extremely broad, transverse, brown band near the middle of elytra. Hood small, brown, a little higher and slightly more inflated than in *picta*. Paranota with the distal three-fourths brown, pale testaceous in front, about as high as median carina. Median carina more elevated than in *picta*, uniseriate; lateral carinæ as in *picta*. Sternal laminæ pale testaceous, the rostrum almost reaching mesometasternal suture. Antennæ brown, the terminal segment brownish black. Elytra with extremely broad, transverse, basal band (about one-third of elytra), the apical third and all of sutural area brown; costal area largely biseriate, a little broader than subcostal area, the latter biseriate. Wings embrowned.

Length, 3 mm; width, 1.05.

Holotype, female, Sandakan, Borneo (U. S. Nat. Mus.); paratype, female, taken with the type (Drake collection). The pronotum is strongly narrowed in front as in *picta*, and in *abundantis* sp. nov. described below.

CYSTEOCHILA ABUNDANTIS sp. nov.

Testaceous, with a few small fuscous spots. Head dark brown, with five short, blunt testaceous spines. Eyes large, reddish. Antennæ light brown, indistinctly pilose; segment I short, slightly stouter and slightly longer than II; III two and one-half times as long as IV. Buccula testaceous, closed in front. Sternal laminæ testaceous; rostrum brownish, the apex dark, extending to end of mesosternum. Body beneath brown.

Pronotum brown, strongly convex, strongly and abruptly narrowed in front, the humeri broad and prominent, hood very small, placed a little behind the anterior margin of pronotum, the latter faintly produced forward at middle; lateral carina reticulate, covered on disk by paranota, bowed outwardly on triangular process, curved inwardly at apex. Paranota broad, resting on dorsal surface of pronotum, not touching the median carina. Elytra testaceous, with a few small fuscous spots, slightly constricted beyond middle; costal area with one row of moderately large cells along the outer margin and with a partial inner row of much smaller cells; subcostal area a little broader, biseriate; discoidal area impressed, widest slightly beyond middle, there five areolæ deep, narrowed at both base and apex, the outer margin slightly sinuate. Legs brown, the tips of femora and basal two-thirds of tibiæ lighter.

Length, 3.25 mm; width, 1.05.

Holotype, male, and allotype, female, Tangkulan, Bukidnon Province, Mindanao (Drake collection); 30 paratypes, taken with the type and from Cuernos de Negros, Oriental Negros Province, Negros; Victorias, Occidental Negros; Iligan, Zamboanga, and Davao, Mindanao; Los Baños and Mount Maquiling, Luzon (U. S. Nat. Mus. and authors' collections).

CYSTEOCHILA VISENDA sp. nov.

Elongate, quite smooth in general appearance, testaceous, with fuscous markings. Antennæ rather long, brown, finely pilose; segment I short, slightly stouter and a little longer than II; III three times as long as IV. Rostral laminæ testaceous, the channel narrow and open behind, the rostrum extending be-

tween hind coxæ. Bucculæ testaceous, darker and contiguous in front. Eyes reddish.

Pronotum strongly convex, testaceous, more or less covered with whitish exudation, sharply tricarinate; with slightly raised triangular area in front, the anterior margin scarcely produced forward at middle; paranota broad, testaceous, resting upon dorsal surface of pronotum, touching lateral carinæ, sharply rounded behind; lateral carinæ slightly bowed inwardly on the disk, more widely separated and slightly bowed outwardly on triangular process; median carina more elevated on disk; all carinæ thick, testaceous on triangular process. Elytra testaceous, with fuscous markings, constricted beyond middle; costal area rather narrow, uniseriate; subcostal area wider, biseriate, with a transverse, brownish band near the middle; discoidal area long, extending beyond middle of elytra, slightly more than apical half brownish, widest near middle, there six areolæ deep, the outer boundary nearly straight; sutural area more widely reticulate behind, considerably embrowned, with a light-colored spot a little before the apex. Body beneath dark fuscous-brown. Legs testaceous.

Length, 3.60 mm; width, 1.

Holotype, male, Cuernos Mountains, Oriental Negros Provinces, Negros (Drake collection); allotype, female, taken with the type (U. S. Nat. Mus.). The very smooth general appearance, especially the paranota, separates this species at once from closely allied members of the genus.

CYSTEOCHILA BAKERI sp. nov.

Moderately large, brown-fuscous, with six conspicuous white spots on the elytra. Head black, with five short, blunt, brown spines. Bucculæ closed in front, brown, testaceous behind. Sternal laminæ testaceous, widely separated and cordate on metasternum. Rostrum brown, black at apex, extending to middle of metasternum. Hood very large, inflated, resting obliquely on the pronotum. Pronotum very coarsely pitted, moderately convex, tricarinate, each carina foliaceous and composed of one row of areolæ, the lateral carinæ concealed by inflated paranota except on triangular process, there faintly bowed. Median carina slightly more elevated on disk. Paranota strongly developed, inflated, convex above, resting upon, and extending a little beyond, lateral carinæ; brown, pale testaceous in front.

Antennæ moderately long, pale brown, smooth, apical segment darker; segment I short, slightly longer and stouter than

II, the latter obconical; III faintly enlarged at apex, about one and three-fourth times as long as IV, the latter slightly enlarged and moderately hairy. Elytra when in repose strongly overlapping and jointly rounded behind, a large spot at base of each elytron, a smaller spot at apex of discoidal area (extending into subcostal area), and a still smaller spot about half way between the latter and apex of elytra whitish (veinlets light in color and covered with white exudation); costal area moderately narrow, mostly uniseriate, a few extra cells in basal portion and sometimes two or three divided cells in constricted area; subcostal area broader, biseriate; discoidal area impressed, five cells deep in widest part slightly beyond middle, bounded by a strongly raised nervure, the outer margin sinuate.

Length, 3 mm; width, 1.20.

Holotype, female, Surigao, Mindanao (U. S. Nat. Mus.); allotype, male, Mount Maquiling, Laguna Province, Luzon (Drake collection). The latter specimen is somewhat teneral and much lighter in color. The white spots on the elytra make this insect very conspicuous. The elongate hood and differently formed paranota separate it at once from its congeners.

Genus DIPLOGOMPHUS Horvath, 1906

Diplogomphus Horvath, Paris Bull. Soc. Ent. (1906) 296.

Haplotype, *D. capusi* Horvath.

The enormously developed humeral elevations (paranota) readily separate this genus and *Elasmognathus* Kirby from *Cysteochila* Stål, *Oncophysa* Stål, and *Physatochila* Stål. Bergroth, Revue Russe d'Entom. 17 (1917) 104, pointed out that *Bredenbachius* Distant is inseparable from *Cysteochila* Stål; he also transferred *Elasmognathus hewitti* Distant to the genus *Diplogomphus*. *Elasmognathus inusitatus* Drake and *E. napalensis* Distant also should be transferred to the genus *Diplogomphus*. The latter now contains five species; namely, *D. capusi* Horvath from China; *inusitatus* (Drake) from Luzon, Philippine Islands; *napalensis* (Distant) from India; *greeni* (Kirby) from Ceylon; and *hewitti* (Distant) from Borneo.

Genus ELASMOGNATHUS Fieber, 1844

Elasmognathus Fieber, Ent. Mon. (1844) 90.

Haplotype, *E. helferi* Fieber.

The enormously and strikingly developed humeral elevations (paranota) which are deeply excavated behind are very different in form from the slightly larger, somewhat cylindrical, usually knob-tipped humeral elevations of the genus *Diplogom-*

phus Horvath. The genus *Elasmognathus* contains only two known species, *helferi* Fieber from India and the Philippines and *fieberi* Stål from Africa. The writers have a female specimen of *helferi* from Mount Maquiling, Luzon.

ONCOPHYSA NITENTIS sp. nov.

Very small, slender. Head black, convex above, with five very long, appressed, brownish black spines. Bucculæ broad, contiguous in front, back, testaceous behind. Rostral laminæ testaceous, the rostrum extending between middle coxæ. Antennæ rather short, indistinctly pilose, brown, segment I short, stout; II shorter and a little more slender; III two and one-half times the length of IV, the latter pilose and slightly enlarged towards apex.

Pronotum strongly convex, sharply tricarinate; collar testaceous, reticulate, slightly raised, deeply emarginate, roundly excavated in front; paranota strongly reflexed and resting tightly upon the dorsal surface of pronotum, practically touching the median carina in widest part, dark fuscous, smooth, shiny, the hind margin broadly curved; triangular process long, reticulate, testaceous; lateral carinæ testaceous and divarieating on triangular process, darker, mostly concealed on disk by paranota; median carina dark fuscous on disk, testaceous on triangular process; triangular portion of pronotum in front between paranota raised and testaceous. Elytra narrow, testaceous; subcostal area biseriate; discoidal area extending beyond middle of elytra, widest near middle; sutural area becoming more widely reticulate behind; costal area obsolete. Body beneath black. Legs brown.

Length, 3.45 mm; width, 1.

Holotype (female), Mount Banahao, Luzon (Drake collection). This is the first record of this genus in the Philippines. This new species is much smaller than the Australian species. *Oncophysa constantis* Drake from China belongs to the genus *Cysteochila* Stål.

DIPLOCYSTA NUBILA Drake.

Diplocysta nubila DRAKE, Philip. Journ. Sci. 32 (1927) 55.

Three specimens, Singapore, Straits Settlements.

DIPLOCYSTA NIMIA Drake.

Diplocysta nimia DRAKE, Philip. Journ. Sci. 32 (1927) 54.

Iligan and Zamboanga, Mindanao, and Samar. Cuernos Mountains, Negros, is the type locality. This species shows

some variation in color, some specimens being much darker than others. The female, viewed from above, looks no different from the male.

TRACHYPEPLUS BAKERI Drake.

Trachypeplus bakeri DRAKE, Philip. Journ. Sci. 34 (1927) 308.

Twelve specimens, Iligan, Mindanao. Type locality.

LEPTOTYPHA HOSPITA sp. nov.

Pronotum brown, strongly convex above, very coarsely pitted, almost reticulate; collar distinct, reticulate, slightly excavated in front, median carina fairly distinct; lateral carinæ almost obsolete, constricted beyond middle. Elytra narrowed posteriorly, brown, the apical portion of discoidal area and nervelets of sutural area fuscous; costal area extremely narrow, very finely uniseriate; subcostal area much broader, biseriate; discoidal area broad, the outer boundary slightly sinuate and not prominent. Antennæ moderately stout, brown; segment I a little longer and stouter than II, the latter obconical; III distinctly enlarged at apex, less than three times as long as IV, the latter dark and hairy. Legs moderately stout, brown. Body beneath brownish black.

Length, 3 mm; width, 1.

Holotype, female, Penang Island, Straits Settlements. The very coarsely pitted pronotum separates this species at once from *L. capitata* Kiritshenko and the numerous American members of the genus.

ETEONUS SARPTUS sp. nov.

Broadly ovate, dark fuscous-brown, the legs, antennæ, and small basal portion and distal two-fifths of costal area of elytra largely testaceous. Head blackish, sparsely clothed with golden pubescence, the spines obsolete. Eyes very large, transverse, finely faceted. Antennæ moderately long, testaceous, the basal segment reddish brown, stouter than, and almost twice as long as, II; III long, slender, indistinctly pilose; IV wanting. Buculæ light brown, contiguous in front, each side distinctly widened behind. Rostrum testaceous, reaching beyond middle of metasternum; rostral channel shallow, laminæ testaceous. Legs rather slender, testaceous, the tips of tarsi brown.

Pronotum very strongly convex above, deeply and coarsely pitted, sharply unicarinate, sparsely clothed with fine, short, recumbent, golden hairs; collar obliquely truncate in front, scarcely raised, coarsely pitted; calli impressed, black; lateral spines

(oppposite humeri) represented by indistinct teeth. Elytra broadest in front of middle (at apex of triangular pronotal process), constricted beyond middle, when at rest strongly overlapping and jointly rounded behind, the outer margin indistinctly serrate; costal area wide, with an extremely broad, transverse, fuscous-brown fascia (nervelet) in front of middle, mostly triseriate; subcostal area scarcely broader with three to four rows of areolæ; discoidal area bounded by a raised nervure, the outer boundary slightly sinuate, narrowed at both apex and base, widest beyond middle, there with a small brown spot and five areolæ deep; sutural area becoming more widely reticulate behind, with one row of regularly arranged large cells along the hind margin.

Length, 3.04 mm; width, 1.38.

Holotype, female, Surigao, Mindanao (Drake collection); allotype, male, taken with the type (U. S. Nat. Mus.). The much broader and triseriate costal area and much slenderer antennæ separate this species from *E. sagittata* Drake and Poor of India.

The writers have one specimen of *E. dilatus* Distant from Musha, Formosa, taken May 20, 1932. This specimen differs from Distant's figure of the type in not having conspicuous spines on sides of pronotum and in the different arrangement of areolæ in costal area; it agrees very well, however, with Takeya's figure of *dilatus*, Mushi 4 (1931) 82, pl. 9, figs. 11–14.

ETEONUS VIRTUTIS sp. nov.

Moderately large, sparsely clothed with fine, rather short, pale hairs. Head slightly convex above, dark brownish black, shiny. Eyes very large, dark. Antennæ moderately long, clothed with long hairs, brown, the first or the first two segments testaceous; segment I stouter and slightly longer than II; III faintly tapering towards apex, slightly more than twice as long as IV. Buccule brown, closed in front. Sternal laminæ brown, the rostrum extending to the metasternum. Body beneath brown, legs testaceous, the tarsi dark.

Pronotum strongly convex, coarsely punctate, slightly shiny, brown, the anterior margin truncate, testaceous. Paranota represented by a narrow ridge, slightly wider opposite humeri. Elytra broad, when at rest strongly overlapping and jointly rounded behind; costal area broad, mostly testaceous, triseriate, the areolæ hyaline, the outer nervure very strongly costate and dark brown; subcostal area biseriate in male and triseriate in female; discoidal area brown, moderately large, reaching at

least to middle of elytra, narrowed at both base and apex, the marginal nervure slightly sinuate; sutural area becoming testaceous posteriorly, the areolæ hyaline. Elytra much broader and more ovate in female than male. Wings much longer than abdomen, dusky.

Length, 3.25 mm; width, male, 1.32, female, 1.50.

Holotype, male, Mount Maquiling, Laguna Province, Luzon (U. S. Nat. Mus.); allotype, female, taken with the type (Drake collection). The strongly costate nervure along outer margin of elytra distinguishes this species from any of its congeners.

ETEONEUS VISENDUS sp. nov.

Very elongate, brown, the elytra uniformly tinged with yellow. Head reddish brown, with the median spine reduced to a small tubercle, the others wanting. Eyes very large, transverse, black, coarsely faceted. Antennæ very long, rather densely clothed with moderately long, whitish hairs; segments I and II very short, yellowish brown, subequal in length; III dark fuscous-brown, very long, straight, two and one-half times as long as IV, the latter faintly enlarged and about three times as long as the first two conjoined. Bucculæ closed in front. Rostrum very long, pale brown, tip dark, extending to base of abdomen. Legs very long, slender, testaceous, the tarsi dark.

Pronotum strongly convex, coarsely pitted, truncate in front, the triangular portion long, lighter; median carina distinct but not strongly elevated; collar distinctly reticulate, only slightly raised; calli impressed, shiny, reddish brown. Elytra very long, considerably longer than abdomen, slightly constricted beyond middle, when in repose jointly rounded behind; costal area broad, mostly triseriate, some places irregularly quadriseriate, the areolæ hyaline and not very large; subcostal area narrow, biseriate in male, triseriate in female; discoidal area reaching almost to middle of elytra, widest opposite apex of pronotal process, there six areolæ deep, narrowed both at apex and base; sutural area becoming more widely reticulated distally. Pronotum, head, and reticulations sparsely and indistinctly clothed with short, recumbent, pale hairs. Body beneath brown, the thorax darker. Male claspers strongly curved.

Length, 3.80 mm; width, 1.32.

Holotype, male, Imugan, Nueva Vizcaya Province, Luzon (Drake collection); allotype, female, taken with the type (U. S. Nat. Mus.). Many paratypes from the same locality. The greater length and longer appendages of this species are dis-

tinguishing characters. The female is a little broader than the male. The costal margin of elytra is fringed with short, fine, pale hairs.

PHYLLONTOCHILA RAVANA (Kirkaldy).

Sakuntala ravana KIRKALDY, Journ. Bombay N. H. Soc. 14 (1902) 208.

Phyllontochila ravana DISTANT, Ann. Soc. Ent. Belg. 47 (1903) 51; Fauna Brit. Ind. Rhynch. 2 (1904) 136, fig. 99.

Singapore, Straits Settlements, 1 specimen. Feeds on *Vitex trifolia* and is widely distributed in the Philippines.

PHYLLONTOCHILA PHILIPPINENSIS Distant.

Phyllontochila philippinensis DISTANT, Ann. & Mag. Nat. Hist. 9 (1902) 355.

Many specimens, Bauang, Union Province; Los Baños, Laguna Province; Zambales Province, Luzon. The authors are indebted to Mr. W. E. China for comparing some of these with Distant's type.

PHYLLONTOCHILA EROSA (Fieber).

Monanthia erosus FIEBER, Ent. Mon. (1844) 71, pl. 6, figs. 5–9.

Tingis erosa WALKER, Cat. Het. 4 (1873) 181.

Phyllontochila erosa DISTANT, Ann. & Mag. Nat. Hist. 9 (1902) 355.

Ammianus erosus DISTANT, Fauna Brit. Ind. Rhynch. 2 (1904) 137, fig. 100.

Mount Maquiling, Laguna Province, Luzon, 2 specimens. Widely distributed in the Philippines.

BELENUS DENTATUS (Fieber).

Monanthia dentata FIEBER, Ent. Mon. (1844) 71, pl. 6, figs. 2–4.

Phyllontochila dentata STÅL, Enum. Hemip. 3 (1873) 128; DISTANT, Fauna Brit. Ind. Rhynch. 2 (1904) 136.

Belenus dentatus DISTANT, Fauna Brit. Ind. Rhynch. 5 (1910) 110, fig. 58.

Mount Maquiling, Laguna Province, Luzon, 6 specimens.

RADINACANTHIA PRUDENTIS sp. nov.

Very slender, elongate. Head jet black, shiny, convex above, armed with five yellowish brown, blunt spines; posterior pair long, appressed, reaching almost to the base of antennæ; median shortest, blunt, bent downward; anterior pair more slender, directed downward and inward. Eyes large, black. Bucculæ broad, with a yellowish tinge, contiguous in front. Rostral channel wide, the rostrum reaching to middle of mesosternum. Orifice very prominent, testaceous. Antennæ very long, slender; segment I brown, rather long, twice as long as II; III testaceous,

more than twice as long as IV, the latter slightly enlarged and mostly dark fuscous.

Pronotum strongly convex, shiny, deeply and very coarsely pitted, brown, with a broad, longitudinal fuscous band on middle of each side; median carina with two distinct areolæ at base of collar, thence posteriorly with indistinct areolæ; lateral carinæ present only on the posterior triangular process, not very clearly defined; collar prominent, reticulate, very faintly produced forward at middle; paranota testaceous, present only on anterolateral margin, composed of two to four cells. Elytra testaceous, some of the nervures embrowned, faintly constricted beyond middle. Costal area not very broad, uniseriate, areolæ moderately large; discoidal area not quite reaching middle of elytra, narrowed at both base and apex, widest near middle, there five cells deep; sutural area becoming more widely reticulate posteriorly, the cells along inner margin becoming very large. Wings slightly shorter than elytra. Legs long and slender, pale brown, the femora considerably embrowned and shiny, the tarsi dark.

Length, 3.30 mm; width, 0.90.

Holotype, Ambalamadakana, Madagascar, and one paratype taken with the type. Differs from *R. reticulata* Hacker in having stouter antennæ, less-elevated median carina, and stouter, blunter, and appressed spines on head; from *tasmanica* Hacker in having anterolateral paranota and smaller discoidal area. This is the first record of this genus outside of the Australian Region.

HORMISDAS PICTUS Distant.

Hormisdas pictus DISTANT, Philip. Journ. Sci. 5 (1910) 60, pl. 1, fig. 1*a*, *b*.

Biliran Island, Philippines, 4 specimens.

HORMISDAS VICARIUS Drake.

Hormisdas vicarius DRAKE, Philip. Journ. Sci. 32 (1927) 56.

Many specimens, Cadiz, Occidental Negros Province, Negros, on *Urena lobata*, July 18, 1928, *W. D. Pierce*.

STEPHANITIS TYPICA (Distant).

Cadamustus typicus DISTANT, Ann. Soc. Ent. Belg. 47 (1903) 47; Fauna Brit. Ind. Rhynch. 2 (1904) 132, fig. 95.

Stephanitis typica HORVATH, Ann. Mus. Nat. Hung. 10 (1912) 323.

One specimen, female, Mount Maquiling, Laguna Province, Luzon. Other specimens are at hand from Ceylon, Java, and Hainan.

STEPHANITIS QUERCA Bergroth.

Stephanitis quercus BERGROTH, Ann. Soc. Ent. Belg. 64 (1924) 83.

Four specimens, Mount Maquiling, Laguna Province, and 1 from Baguio, Benguet Subprovince, Luzon. Bergroth states that this species feeds on oak which grows only in high altitudes.

STEPHANITIS NITORIS sp. nov.

Moderately large, broad, whitish testaceous, the elytra widening posteriorly and when in repose the tips widely separated; areolæ transparent. Pronotum slightly convex, pale brown, unicarinate; median carina strongly foliaceous, slightly higher than hood, the upper margin rather evenly rounded. Hood rather large, narrow, projecting forward beyond apex of head, compressed laterally, more inflated behind, twice as long as high. Paranota broad and long, four areolæ deep, strongly reflexed, the hind margin recurved.

Antennæ long, slender, indistinctly pilose, pale testaceous; segment I long, three times as long as II, the latter short; III less than twice as long as IV, the latter very long, distinctly pilose and faintly enlarged. Elytra broad, the outer margin rounded and finely serrate; costal area broad, with five rows of areolæ in widest part, two or three transverse veinlets in front of the middle embrowned; discoidal and subcostal areas jointly raised, forming a large tumid elevation, the subcostal area broad and biseriate; discoidal area not reaching middle of elytra, widest near apex, there triseriate; the hind margin truncate; the sutural area biseriate behind discoidal area. Wings clear, a little longer than abdomen. Bucculæ contiguous in front. Legs slender, pale testaceous.

Length, 3.35 mm; width, 2.25.

Holotype, male, and allotype, female, Mount Maquiling, Laguna Province, Luzon (U. S. Nat. Mus.); paratype, female, taken with the type. In addition the authors have one specimen from Occidental Negros Province, taken by W. D. Pierce. This specimen was preserved in alcohol and is slightly discolored and distorted, but apparently is *nitoris*. The shape of the elytra and the lack of prominent color markings separate this species from other members of the subgenus *Norba* Horvath. The veinlets are sparsely clothed with extremely fine hairs.

ACONCHUS URBANUS (Horvath).

Calcatus (Aconchus) urbanus HORVATH, Ann. Mus. Nat. Hung. 3 (1905) 565.

Pekalongan, Java, April, 1907, *F. Muir;* Kuala Lumpur, Selangor, Federated Malay States, September 10, 1922, *H. M. Pendlebury.*

DULINIUS CONCHATUS Distant.

Dulinius conchatus DISTANT, Ann. Soc. Ent. Belg. 47 (1903) 46.

Five specimens: Samarang, Java, *Edw. Jacobson;* Mount Maquiling, Laguna Province, Luzon; Occidental Negros Province, Negros.

Genus HOLOPHYGDON Kirkaldy, 1908

Holophygdon KIRKALDY, Proc. Linn. Soc. (Sydney) 23 (1908) 364; HORVATH, Treubia 8 (1926) 328.
Alloiothucha DRAKE, Philip. Journ. Sci. 32 (1927) 58.

Haplotype, *H. melanesica* Kirkaldy.

The genus *Alloiothucha* Drake is here suppressed as a synonym of *Holophygdon* Kirkaldy. This genus now contains four species, namely, *melanesica* Kirkaldy from Fiji, *artocarpi* Horvath from Java, and *philippinensis* (Drake) and *necopinata* (Drake) both from the Philippines. In addition to the latter two species the writers have a single specimen of *artocarpi* Horvath from Buitenzorg, Java, taken in 1926 by L. G. E. Kalshoven.

ILLUSTRATION

PLATE I. *Perissonemia torquata* g. et sp. nov. (Drawing by M. E. Poor.)

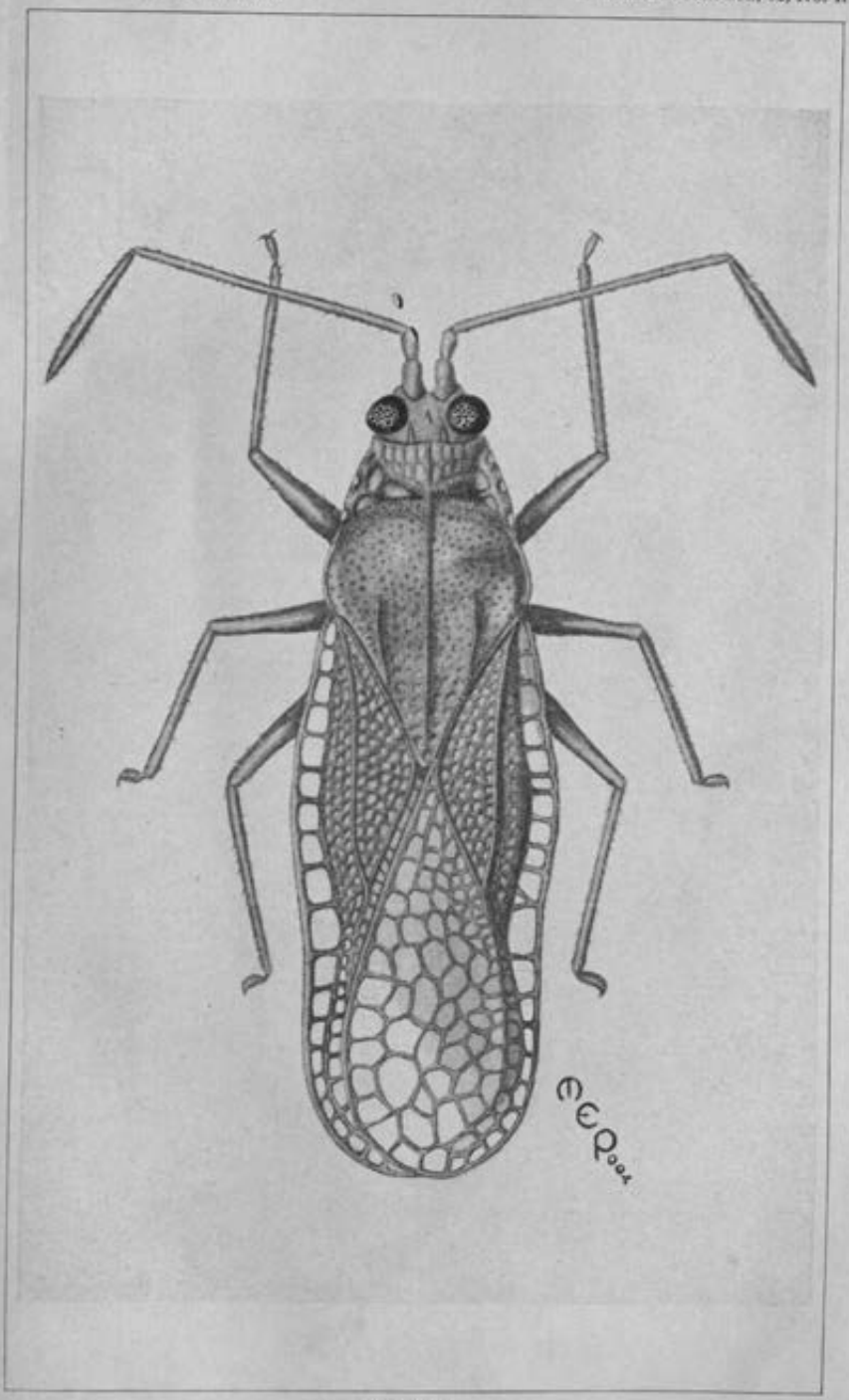

PLATE 1.

CHIRONOMIDÆ FROM JAPAN (DIPTERA), IX

TANYPODINÆ AND DIAMESINÆ [1]

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FIVE PLATES

In this report I discuss monographically the Japanese Tanypodinæ and supplement my previous paper on the Japanese Diamesinæ with descriptions of several species newly found in Honshu, central Japan.

I am greatly indebted to Dr. Hachiro Yuasa and Dr. Chukichi Harukawa for their kind help which made this report possible. Sincere thanks are extended to Dr. Teiso Esaki, Dr. Ryoichi Takahashi, Messrs. Kinji Imanishi, Tokichi Kani, Nanzaburo Omori, Tadao Masuda, Masaaki Morishita, Kazuo Shibuya, Noriaki Sugiyama, and Yoshihiro Yoshimura, and Miss Tamiko Ueno for material and literature.

The taxonomic system adopted in this paper is mainly that of Dr. F. W. Edwards. The morphological terminology is based on my previous papers. The antennal ratio is the ratio between the length of the ultimate segment and the length of the remaining segments, except the scape, taken together and, in the case of the male in the Tanypodinæ, between the length of the ultimate two segments together and the length of the remaining segments, except the scape, taken together. The leg ratio is the proportional length of the first tarsal segment of the leg to the length of the tibia. Abbreviations used in the text refer to Plate 2, fig. 17, and Plate 4, fig. 63.

TANYPODINÆ

About ten species of the subfamily Tanypodinæ have been recorded from Formosa by the late J. J. Kieffer (1918–1922), but from other parts of the Japanese Empire the family is quite unknown. Large collections from various localities, mainly Honshu, contain about twenty-four species, including about fifteen new species, that must be added to this subfamily of the Japanese chironomids.

[1] Contribution from the entomological laboratory of Kyoto Imperial University, No. 60.

Key to the genera of the Tanypodinæ.

1. R_{2+3} present and usually forked, except when R_1 and R_{1+5} are in contact ..... 2.
   R_{2+3} absent, R_1 and R_{1+5} not in contact ..... 7.
2. Fourth tarsal segment more or less cordiform, shorter than fifth ..... 3.
   Fourth tarsal segment cylindrical, not shorter than fifth ..... 4.
3. Anastomosed vein $M_{3+4} + Cu_1$ absent or very short, being less than one-sixth as long as free distal section of Cu_1 ..... *Calotanypus* Kieffer.
   Anastomosed vein $M_{3+4} + Cu_1$ elongated, being from one-third to one-half as long as free distal section of Cu_1 ..... *Clinotanypus* Kieffer.
4. Anastomosed vein $M_{3+4} + Cu_1$ present, crossvein m-cu absent ..... 5.
   Anastomosed vein $M_{3+4} + Cu_1$ absent, crossvein m-cu present ..... 6.
5. Anastomosed vein $M_{3+4} + Cu_1$ more than half as long as distal free section of Cu_1 ..... *Procladius* Skuse.
   Anastomosed vein $M_{3+4} + Cu_1$ less than one-third as long as distal free section of Cu_1 ..... *Tanypus* Meigen.
6. Costa much produced beyond end of R_{4+5} ..... *Anatopynia* Johannsen.
   Costa not or scarcely produced beyond end of R_{4+5} ..... *Pentaneura* Philippi.
7. Costa produced beyond end of R_{4+5} ..... *Podonomus* Philippi.
   Costa not produced beyond end of R_{4+5} ..... *Parochlus* Enderlein.

Of the above-mentioned eight genera of the Tanypodinæ only the following five have been known from Japan including Formosa: *Clinotanypus*, *Procladius*, *Tanypus*, *Anatopynia*, and *Pentaneura*.

Genus CLINOTANYPUS Kieffer

There have been known six species of this genus from Japan, of which three species were reported from Formosa by Kieffer ten or more years ago. They are all specific in coloration and easily distinguishable by this character.

Key to the Japanese species of Clinotanypus.

1. Wing with transversal band ..... 2.
   Wing without transversal band ..... 3.
2. All femora entirely yellow ..... *C. formosæ* Kieffer.
   All femora blackish apically ..... *C. decempunctatus* sp. nov.
3. Thorax blackish ..... 4.
   Thorax yellowish ..... 5.
4. Thorax entirely black ..... *C. immaculatus* Kieffer.
   Thorax with paired yellow spots ..... *C. japonicus* sp. nov.
5. Wing with marginal areas of r-m hyaline ..... *C. lampronotus* Kieffer.
   Wing with marginal areas of r-m dark ..... *C. sugiyamai* sp. nov.

CLINOTANYPUS FORMOSÆ Kieffer.

Clinotanypus formosæ KIEFFER, Ann. Mus. Nat. Hung. 14 (1916) 99; Philip. Journ. Sci. 18 (1921) 576.

This fly was collected at Anping and Takao, Formosa, by Sauter.

Female.—Body 2.8 mm in length, reddish in general appearance. Antennæ yellow, 14-segmented; ultimate segment with a long basal seta, slightly longer than preceding four segments together. Legs yellow; distal ends of tibiæ of fore and hind legs, distal end of first tarsal segment of foreleg, and second to ultimate tarsal segment of foreleg, distal ends of third tarsal segments of middle and hind legs, ultimate two tarsal segments of middle and hind legs all dark brown; first tarsal segments of all legs at least as long as the following four segments together; empodium short. Halteres whitish. Wing with a short apical brown band distad of crossvein and cephalad of M_{3+4}; r-m and first section of M_{3+4} and their marginal areas black; costa distinctly produced beyond end of R_{4+5}, almost reaching wing tip; anastomosed vein $M_{3+4} + Cu_1$ shorter than half of free Cu_1.

CLINOTANYPUS DECEMPUNCTATUS sp. nov.

This species is widely distributed in Honshu, Japan, and often collected at light trap.

Female.—Body 3.2 to 4.4 mm, ground color yellow; thoracic notum with dark markings on orange-yellow or deeply yellow vittæ; abdomen with brown bands; wing with a short brown band distad of crossvein, transversal veins and their marginal areas black.

Head, excepting black eyes, yellow; antennæ yellow, with scapes black, 14-segmented; ultimate segment subequal to preceding four segments together, with several basal setæ but without apical setæ; antennal ratio 0.3 to 0.35. Thorax yellow in ground color; scutum with ten black spots: one pair of small spots at shoulder parts, two pairs of elongate spots on lateral sides of yellowish median vittæ, one pair of large elongate spots on lateral sides of yellowish lateral vittæ, and one pair of small spots just caudad of lateral vittæ; scutellum yellow, brownish along cephalic margin; postscutellum pale brown, with three dark clouds on posterior margin; pleuron extensively yellow, with a dark spot near wing base; in darker specimens two pairs of elongate spots of scutum often fused longitudinally and postscutellum entirely black. Legs with ground color yellow; femoral tips and tibial tips of all legs dark brown; middle femur very broadly brown at middle part; hind femur broadly pale brown at middle; fore and middle tibiæ brown at basal half; distal end of first tarsal segment and ultimate four tarsal segments of foreleg black; distal half or more of third tarsal segment and ultimate two tarsal segments of middle leg black;

tarsal segments of hind leg as in middle leg in color; pulvilli absent; empodium short; tarsal spurs present on proximal three segments of middle and hind legs, absent on foreleg; proportional lengths of segments of legs 85 : 101 : 71 : 35 : 22 : 10 : 13 in foreleg, 87 : 92 : 59 : 26 : 15 : 9 : 2 in middle leg, and 78 : 100 : 65 : 36 : 23 : 10 : 14 in hind leg. Halteres white. Wing (Plate 2, fig. 16) with a short, broad brown band, base of radial veins and two transversal veins and their marginal areas black; but posterior transversal vein hyaline at middle; costa distinctly produced, but not reaching tip of wing. Abdomen yellow in ground color; tergum with a pair of brown clouds; terga, second, third, fourth, sixth, and seventh, each with a broad brown band on anterior part; fifth and eighth terga with bands more or less reduced, being narrower or interrupted at middle; cerci white; spermathecæ small, spherical, pale brown or yellow.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic female; Shimogamo, Kyoto; April 8, 1930.

Paratypes.—Alcoholic and dry females; Yamashina, Kyoto; September 5, 1932, and July 10, 1934; Imaizumi, Aomori Prefecture; July 27, 1935.

Type specimens.—Deposited in the entomological laboratory, Kyoto Imperial University; collected by Messrs. T. Masuda and M. Morishita and by myself.

This species is closely allied to the preceding Formosan species, *Clinotanypus formosæ* Kieffer, but distinctly different in the coloration of legs and scutum.

CLINOTANYPUS IMMACULATUS Kieffer.

Clinotanypus immaculatus KIEFFER, Ann. Mus. Nat. Hung. 14 (1916) 99–200.

This black species was collected at Tainan, Formosa.

Female.—Body shining, black, bare, 2.8 mm in length, wings hyaline, without bands or clouds. Head reddish brown. Antennæ reddish yellow, 14-segmented; ultimate segment equal in length to preceding two segments together, with a short apical stylet. Thoracic sclerites reddish brown. Legs brownish black; trochanters and proximal half of all femora, a narrow middle ring of middle tibia, a broad middle ring of hind tibia, proximal two-thirds of first tarsal segment of foreleg, proximal three tarsal segments of middle and hind legs all white; first tarsal segment hardly as long as following four segments together.

Halteres gray. Wings hyaline, without markings; two transversal veins hyaline as in longitudinal veins.

CLINOTANYPUS JAPONICUS sp. nov.

Male.—Body length 5.3 mm. Head reddish brown. Antennæ with proximal half including scapes reddish brown, distal half brown, without apical setæ; antennal ratio about 2.3. Mouth parts yellow. Thorax mainly black, shining; scutum with a pair of distinct yellow spots on shoulder parts; scutellum and postscutellum black; pleural membranes yellow; legs with coxæ black, trochanters pale brown; femora black, pale brown at base; tibiæ black, but hind tibia paler at middle. Tarsi yellowish on basal segments, dark brown on distal segments; first segment and proximal half of second segment of fore tarsus yellow, remaining parts brown or dark brown; proximal two segments of middle and hind tarsi yellow; remaining three segments brown or dark brown; tarsal spurs on proximal three segments of middle and hind legs, absent on foreleg; empodium short; pulvilli absent; relative lengths of segments of legs as follows: 80 : 103 : 63 : 32 : 22 : 10 : 12 in foreleg, 81 : 85 : 50 : 20 : 13 : 7 : 10 in middle leg, and 77 : 98 : 65 : 29 : 19 : 8 : 11 in hind leg. Halteres black. Wings (Plate 2, fig. 17) hyaline, without clouds; crossvein r-m straight, dark. Abdomen entirely dark brown, somewhat paler at side; hypopygium as in Plate 2, fig. 24.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic male; Kinugasa, Kyoto; May 22, 1930; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This species is closely allied to *Clinotanypus nervosus* Meigen, but distinctly different in coloration of legs. Another allied species may be *Clinotanypus immaculatus* Kieffer, but in this species the thorax is not provided with paired yellow spots.

CLINOTANYPUS LAMPRONOTUS Kieffer.

Clinotanypus lampronotus KIEFFER, Ann. Mus. Nat. Hung. 14 (1916) 100.

This yellowish white species was found at Takao (altitude about 300 m), Formosa.

Male.—Body length about 5 mm, whitish yellow; wings hyaline, without markings. Antennæ 14-segmented, brownish, with scapes brownish yellow; antennal ratio about 2; maxillary palpi yellow. Thorax reddish brown; scutum whitish yellow, with

three reddish yellow vittæ. Legs whitish; distal ends of all tibiæ, distal end of first tarsal segments and remaining four tarsal segments of foreleg, three distal segments of middle leg, distal end of third tarsal segment, and two ultimate segments of hind leg dark brown; first tarsal segment of foreleg slightly shorter than tibia; empodium very short. Halteres whitish. Wings hyaline, without clouds; r-m oblique, black; first section of M_{3+4} hyaline as in longitudinal veins; costa produced, almost reaching tip of wing; stem of fMCu much longer than one-third of Cu_1. Abdominal terga of first three segments each with a large dark brown band; fourth tergum with a small cloud, fifth tergum with a transversal band; hypopygium brownish.

CLINOTANYPUS SUGIYAMAI sp. nov.

This distinctly marked species was collected at light.

Male.—Body about 4.8 mm in length; wing with a central black spot; thorax with black spots on reddish yellow vittæ; abdomen with dark brown bands.

Head mainly yellow, with eyes golden black, with a pair of small pure white spots between scapes and eyes. Antennæ 14-segmented, brown, with last segment pale brown; plumose hairs yellowish brown; antennal ratio about 4.1. Thorax extensively pure white; pronotum, pleural membrane pure white; scutum extensively pure white on shoulder parts and caudoscutal area, with orange yellow vittæ, and eight black spots; two pairs of small spots on lateral margins of median vittæ, one pair of large spots on lateral margins of lateral vittæ, one pair of very small spots just caudad of lateral vittæ; scutellum yellowish white on anterior part, yellow on posterior part; postscutellum orange yellow, dark on posterior part; pleural and sternal sclerites yellow; posterior notepisternum with a black spot; epimeron with an elongate brown cloud; sternepisternum with a broad transversal black stripe. Legs yellow in ground color with dark markings; distal ends of all femora and tibiæ black; fore tarsus entirely black; distal three tarsal segments of middle leg black; distal half of third tarsal segment and distal two segments of hind leg black; ultimate tarsal segments of all legs somewhat paler, being brown; middle part of femur and basal half of tibia of middle leg dark brown; proportional lengths of segments of legs 70 : 82 : 67 : 33 : 19 : 7.5 : 10 in foreleg, 77 : 75 : 55 : 24 : 12 : 7 : 9.5 in middle leg, and 70 : 85 : 58 : 30 : 18 : 7.5 : 9.5 in hind leg. Halteres white. Wing (Plate 2, fig. 18) with a dark central marking; r-m and base of R_{4+5}

black; first section of M_{1+2} hyaline; stem of fMCu about one-third of Cu_1. Abdomen yellow; second, third, and fourth terga, each with a black band at middle; fifth tergum with a small black median cloud; sixth with a narrow black band; first and seventh terga entirely yellow; eighth tergum brown along caudal margin; hypopygium brown, style bare on distal part, with a blunt setigerous lobe at lateroproximal part (Plate 2, fig. 25).

Habitat.—Honshu, Japan.

Holotype.—Alcoholic male; Uzumasa, Kyoto; July 22, 1936; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. N. Sugiyama.

This distinct species is named in honor of the collector, Mr. N. Sugiyama; it somewhat resembles *Clinotanypus decempunctatus* in the coloration of thorax and abdomen, but the brown band of wing is absent and the first section of M_{3+4} is quite hyaline.

Genus PROCLADIUS Skuse

Including *Psilotanypus* Kieffer and *Trichotanypus* Kieffer.

Kieffer reported three species of this genus from Formosa; I add four species newly collected from Honshu. The satisfactory identification of the species of this genus is rather more difficult than in the other genera due to the close similarity in coloration. For the purpose of classification the length of the anastomosed vein ($M_{3+4} + Cu_1$) in relation to the free distal part of Cu_1, mediocubital ratio, may be one of the most useful characters, being comparatively constant for the species.

Key to the Japanese species of Procladius.

1. Macrotrichia of wing membrane completely reduced.
   Subgenus *Psilotanypus* Kieffer.[2]
   Macrotrichia of wing membrane at least present on tip of wing. (Subgenus *Procladius* Skuse.) ..... 2.
2. Mesoscutum yellow in ground color ..... 3.
   Mesoscutum brown or black in ground color ..... 4.
3. Mediocubital ratio 0.6 to 0.7 ..... *P. sagittalis* Kieffer.
   Mediocubital ratio about 0.8 ..... *P. choreus* Meigen.
4. Scutal vittæ confluent ..... 5.
   Scutal vittæ separated ..... 7.
5. Mediocubital ratio about 1; female antennæ 13-segmented.
   P. insularis var. *transiens* Kieffer.
   Mediocubital ratio less than 1; female antennæ 14-segmented ..... 6.
6. Wing with three small white spots on marginal area ..... *P. iris* Kieffer.
   Wing without white spots on marginal area ..... *P. crassinervis* Zetterstedt.

[2] The subgenus *Psilotanypus* is not known to be represented in Japan.

7. Wing with white spots on distal area ..... *P. insularis* Kieffer.
   Wing without white spots on distal area ..... 8.
8. Antennal ratio of male about 1.4; female antennæ 14-segmented.
   P. lacteiclava Kieffer.
   Antennal ratio of male about 1.9; female antennæ 13-segmented.
   P. nipponicus sp. nov.

PROCLADIUS (PROCLADIUS) SAGITTALIS Kieffer.

This species is very common in Japan and often captured at light in summer and autumn.

Male.—Body 3 to 3.5 mm in length; thoracic ground color yellow or pale brownish yellow; wings largely clouded. Head with vertex dark brown, frontoclypeus yellowish. Antenna 15-segmented, with scape black, pedicel yellow, flagellum dark brown; antennal ratio 1.6 to 1.9; maxillary palpi dark brown. Pronotum yellow or pale brown; scutum yellow or pale brownish yellow, with four distinct dark brown lateral and brown median vittæ; caudoscutal area somewhat brown; scutellum yellowish; postscutellum dark brown; pleuron with sclerites dark brown, membranes yellow. Legs with coxæ dark brown; trochanters pale brown; femora brown or pale brown; tibiæ brown or pale brown, with distal ends black; proximal two tarsal segments yellowish white, with distal ends black; distal three tarsal segments black; empodium as long as claws; pulvilli absent; claws each with about four strong basal teeth; proportional lengths of segments of legs 52.5 : 65.5 : 50.5 : 23 : 17.5 : 12 : 87.5 in foreleg, 57.5 : 58.5 : 40 : 17.5 : 13.5 : 9 : 7.9 in middle leg, and 49.5 : 66.5 : 48 : 23 : 17 : 10.5 : 8.5 in hind leg; tarsal spurs on proximal two or three segments of middle and hind legs. Halteres with stem yellow, knob white. Wing dark brown on distal half, costal, subcostal, and anal cells, yellow on first radial and first median cells and proximal areas of cells R_5 and M_2; crossvein and first section of M_{3+4} black; mediocubital ratio 0.6 to 0.62. Abdomen black or dark brown; posterior margin of each tergum pale brown or yellow; style (Plate 2, fig. 29) somewhat triangular, basal lobe being very short, with a strong apical spine.

Female.—Body 2 to 3.2 mm in length, yellow in ground color. Antennæ entirely yellowish white, 13- or 14-segmented; ultimate segment with a small apical seta, longer than preceding four but shorter than preceding five segments together; antennal ratio 0.39 to 0.41. Scutellum with four distinct brown vittæ on yellow ground color. Legs as in male in color, often paler on proximal three tarsal segments; proportional lengths of

segments of legs 45.3 : 56 : 37 : 14.7 : 13.3 : 10 : 7.8 in foreleg, 52 : 55.7 : 35 : 16.3 : 12 : 7.8 : 7 in middle leg, and 44 : 59.3 : 39.7 : 20.3 : 14.3 : 8.7 : 7.7 in hind leg. Halteres white. Wings (Plate 2, fig. 20) with mediocubital ratio 0.64 to 0.68. Cerci (Plate 2, fig. 30) dark brown; spermathecæ (fig. 31) ovoid, brown, with hyaline neck region. Other main structures and color as in male.

Specimens.—Alcoholic males and females; Kyoto: Shimogamo, July 4, 1930; Yamashina, October 11, 1935; Yoshida, July 5, 1936; Mie Prefecture: Toba, August 5, 1934; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. T. Masuda and M. Tokunaga.

PROCLADIUS (PROCLADIUS) CHOREUS Meigen.

Male.—Body about 3.5 mm in length, yellowish in ground color. Head including mouth parts brownish yellow; antennæ also yellowish brown; antennal ratio about 1.75. Thorax pale brownish yellow; scutum with pale brown vittæ; caudoscutal area also pale brown; scutellum pale brownish yellow; postscutellum yellowish brown; pleuron largely yellow; sternal side brown. Legs mainly brownish yellow; distal ends of tibiæ and first tarsal segments darker; distal half of second tarsal segments and ultimate three segments of all legs brown; relative lengths of segments of legs as follows: 52 : 67 : 50 : 23 : 17 : 11 : 8 in foreleg, 59 : 60 : 40 : 18 : 13 : 9 : 8 in middle leg, and 52 : 69 : 48 : 23 : 17 : 10 : 8 in hind leg. Halteres yellowish white. Wings yellowish brown; two transversal veins and marginal areas dark; hyaline on costal, subcostal, first radial, and medial cells, proximal parts of distal radial and medial cells and cephalic part of anal cell; mediocubital ratio 0.82. Abdominal tergum brown on cephalic half or more and yellow on caudal half; hypopygium brown; style with a blunt basal projection.

Female.—Body about 2 mm in length, ground color yellow as in male. Antennæ 14-segmented: ultimate segment shorter than preceding five but longer than four segments together (58 : 65 : 53); antennal ratio about 0.4. Legs rarely with tarsal spurs on first segments of forelegs; proportional lengths of segments 45 : 55 : 36 : 18 : 14 : 10 : 7 in foreleg, 50 : 54 : 32 : 16 : 12 : 8 : 6 in middle leg, and 44 : 57 : 40 : 20 : 15 : 9 : 7 in hind leg. Wings with mediocubital ratio about 0.81. Coloration as in male.

Specimens.—Alcoholic male and females; Hachijo, Kyoto; May 25, 1930; Seto, Wakayama Prefecture; June 21 to 24, 1932;

deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

Wings are closely similar in coloration to those of *Procladius crassinervis* Zetterstedt, basal clear area being far broader than in the preceding species. Styles of the male hypopygium resemble those of *Procladius nipponicus* Tokunaga or are slightly longer.

PROCLADIUS (PROCLADIUS) INSULARIS (Kieffer).

Trichotanypus insularis KIEFFER, Philip. Journ. Sci. 18 (1921) 574–575.

This was collected at Daitotei, Formosa, by Sauter.

Male.—Body length 2.5 mm. Head reddish brown; antennæ yellowish gray, with plumose hairs brownish black. Thorax reddish brown; scutum with three dark vittæ, pruinose on cephalic half; scutellum yellow; postscutellum and sternum brownish black. Legs yellowish gray; distal ends of tibiæ and proximal three tarsal segments brownish black; ultimate two tarsal segments entirely brownish black; first tarsal segment slightly shorter than tibia and about twice as long as second tarsal segment. Halteres pure white. Wings clouded, with white spots, wing base white; three white spots: One at distal one-fourth of cell R_2, one at distal tip of cell M_2, and one on distal part of cell M_4; $M_{3,4} + Cu_1$ long, as long as Cu_1. Abdomen brownish black.

Female.—Body about 1.8 mm. Head and thorax brownish black; scutal vittæ black. Antennæ yellow. Legs dark brown; tarsal segment whitish; ultimate three tarsal segments and distal ends of proximal two segments dark brown. Other coloration mainly as in male.

In the variety *transiens* Kieffer the white spots of wings are more or less reduced, being rarely absent, the mesonotum is shining and without distinct vittæ, and the female antennæ are 13-segmented; the ultimate segment is a little longer than the preceding three segments together, with a basal seta and a short apical stylet. The color of the body is largely similar to that of the type.

PROCLADIUS (PROCLADIUS) IRIS Kieffer.

Trichotanypus iris KIEFFER, Ann. Mus. Nat. Hung. 14 (1916) 101.

This is found at Yentempo, Formosa.

Female.—Body length about 2 mm, mat reddish brown. Antennæ whitish, 14-segmented; ultimate segment very large, somewhat fusiform, with a long basal seta and a small apical stylet.

as long as preceding four segments taken together. Scutum with a black median vitta. Legs whitish; distal ends of tarsal segments, fifth tarsal segment and often fourth tarsal segment darker. Halteres white. Wings clouded on distal half, with three white spots on marginal area: one in cell R_5, one in cell M_2 and in cell M_4; two transversal veins black; $M_{3+4} + Cu_1$ shorter than Cu_1. Abdomen darker than thorax.

PROCLADIUS (PROCLADIUS) CRASSINERVIS Zetterstedt.

This fly was collected in various parts of Honshu in spring and summer.

Female.—Body 2.5 to 3.3 mm in length, largely black. Head with vertex black, frontoclypeus and mouth parts brown. Antennæ brown, 13- or 14-segmented; ultimate segments as long as preceding four segments together, with a small apical seta and five long basal setæ; antennal ratio about 0.34. Pronotum yellow, with a brown cloud on meson of each lateral half, scutum black, shoulder parts yellow; vittæ fused; scutellum dark brown; postscutellum black; pleural membranes yellow; pleural and sternal sclerites black. Legs with coxæ black, trochanters and femoral bases brown, other parts entirely dark brown; proportional lengths of segments 57 : 70 : 49 : 23 : 17 : 13 : 10 in foreleg and 55 : 74 : 62 : 24 : 18 : 12 : 10 in hind leg. Halteres with knobs white. Wings (Plate 2, fig. 22) darkly clouded on caudal and distal half, clear on basal area; mediocubital ratio 0.7 to 0.73. Abdomen black, yellowish on lateral sides; cerci (Plate 3, fig. 44) triangular; spermathecæ (Plate 3, fig. 45) oval, brown, with hyaline neck region.

Specimens.—Alcoholic females; Arashiyama, Kyoto; May 25, 1930; Mount Ryozen, Shiga Prefecture; June 3, 1930; Ikeda, Osaka; May 17, 1935; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. K. Shibuya and M. Tokunaga.

A female collected by Mr. K. Shibuya was found in a nest of a hunting wasp, *Crossocerus wesmaeli* Linden, being stored for the larva of the wasp.

PROCLADIUS (PROCLADIUS) LACTEICLAVA Kieffer.

Trichotanypus lacteiclava KIEFFER, Ann. Soc. Linn. Lyon 69 (1922) 41.

This fly was collected at Daitotei and Maruyama, Formosa, by Sauter.

Male.—Body length 3 mm. Antennæ and plumose hairs brown; fourteenth segment 1.8 times as long as preceding twelve seg-

ments together. Abdomen dark brown; four cephalic terga each with a white band; style dark brown.

Female.—Body about 2 mm, brown in ground color. Antennæ whitish, 13-segmented; last segment brown, as long as preceding five segments together, with a narrow long apical stylet. Scutum gray, pruinose, with three vittæ reddish brown. Legs brownish; articulations darker; fore tibia slightly longer than first tarsal segment. Halteres pure white. Wings clouded, whitish on proximal one-third of anal cell, entire costal and subcostal cells, and narrow areas beyond dark transversal veins.

PROCLADIUS (PROCLADIUS) NIPPONICUS sp. nov.

This fly is often collected at Kyoto in spring and summer at light.

Male.—Body 3.5 to 4 mm in length, dark brown in ground color. Head with vertex and frontoclypeus brown, mouth parts dark brown. Antennæ brown; antennal ratio 1.8 to 1.9. Pronotum pale brown; scutum brown, somewhat yellowish at shoulder parts; vittæ black, indistinct, somewhat fused; scutellum dark brown; postscutellum black; pleuron with membrane pale brown, sclerites brown; sternal side black. Legs with coxæ dark brown; trochanters and basal one-third of femora brown; distal two-thirds of femora black; tibiæ entirely black; first tarsal segments brown; other tarsal segments all black; proportional lengths of segments 48 : 63 : 47 : 22 : 17 : 12 : 9 in foreleg, 54 : 58 : 39 : 18 : 15 : 10 : 9 in middle leg, and 48 : 65 : 45 : 22 : 17 : 11 : 9.5 in hind leg. Halteres white. Wings with coloration as in the preceding species or in *Procladius crassinervis* Zetterstedt; mediocubital ratio about 0.75. Abdominal terga black, narrowly yellow along caudal margin. Hypopygium (Plate 2, fig. 21) black; style with a blunt basal lobe.

Female.—Body length 2.2 to 3 mm; coloration generally as in male. Head with vertex dark brown, frontoclypeus brown; frontal aspect largely yellow. Antennæ 14-segmented, yellowish brown; ultimate segment brown, with several basal setæ: antennal ratio about 0.35, varying from 0.32 to 0.44. Scutum often darker than in male, vittæ being completely fused as in *Procladius crassinervis* Zetterstedt. Proportional lengths of segments of legs as follows: 51.8 : 64.2 : 43.1 : 20 : 15.5 : 11.2 : 8.7 in foreleg, 60.2 : 63.1 : 36.2 : 17.8 : 13.4 : 9.2 : 8 in middle leg, and 50.7 : 67.4 : 44.3 : 22 : 16.2 : 10.6 : 8.7 in hind leg. Wings with mediocubital ratio about 0.7. Abdomen black; posterior margin of each tergum very narrowly yellowish; ultimate

segment somewhat paler; cerci (Plate 2, fig. 33) brown, subtriangular; spermathecæ (Plate 3, fig. 34) oval, dark brown, with swollen hyaline neck region.

Habitat.—Honshu, Japan.

Hollotype.—Male; Kibune, Kyoto; July 10, 1932.

Allotopotype.—Female; July 10, 1932.

Paratypes.—Males and females; Kyoto: Hachijo, May 23 to 30, 1930, and Kibune, July 10 and August 17, 1932.

Type specimens.—Alcoholic; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This fly is closely allied to *Procladius lacteiclava* Kieffer in coloration, but differs in the 14-segmented female antennæ, the relative length of the ultimate segment of the antenna in both sexes, and the relative length of the fore tibia to the first tarsal segment. Another allied species may be *Procladius parvulus* Kieffer, from which the present species is easily distinguishable by the difference in the coloration of the legs.

Genus TANYPUS Meigen

Including *Protenthes* Johannsen.

The following species is the only fly of this genus known from Japan.

TANYPUS PUNCTIPENNIS Fabricius.

Procladius formosanus Kieffer, Suppl. Ent. 1 (1912) 31–32; Ann. Mus. Nat. Hung. 14 (1916) 101; Suppl. Ent. 5 (1916) 116.

Protenthes punctipennis Meigen, Philip. Journ. Sci. 18 (1921) 574; Ann. Soc. Linn. Lyon 69 (1922) 41.

This species is widely distributed in the Northern Hemisphere and has been recorded from Formosa, Tainan, Taihoku, and Daitotei, by Kieffer. There are three specimens from Honshu and Taihoku in our laboratory.

Male.—Body about 4.8 mm in length. Head brown, with eyes bare; antennæ pale brown, with scapes reddish brown, plumose hairs pale brown; ultimate segment with a small apical seta; antennal ratio about 2.3. Pronotum pale brown; scutum reddish brown in ground color, with three black vittæ; postscutellum black; pleural and sternal sclerites reddish brown; pleural membranes yellow. Legs with femora and tibiæ brown; tibial base and preapical ring yellowish brown; knee joints black; both ends of tibia black or dark brown; tarsus yellow in ground color, distal ends of proximal four segments black; ultimate

tarsal segments black; tarsal spurs and pulvilli absent; empodium short; claws simple; proportional lengths of segments of legs 51 : 61 : 51 : 26 : 20 : 14 : 11 in foreleg, 55 : 61 : 50 : 24 : 17 : 12 : 10 in middle leg, and 54 : 71 : 70 : 37 : 29 : 19 : 12 in hind leg. Halteres with stems brown, knobs yellow. Wing (Plate 2, fig. 19) with many brown clouds or spots; transversal veins and marginal areas black; first section of M_{3+4} hyaline at middle; cell R_5 with four or five double brown spots. Abdomen yellowish brown; posterior terga paler; each tergum paler on caudal half; hypopygium (Plate 2, fig. 28) dark brown; style with a thickened ridge along dorsomesal side.

Female.—Body 1.8 to 3.3 mm in length, yellow or pale brown in ground color. Head and mouth parts yellow; vertex brown; antennæ pale brown or yellow, with scapes brown, 15-segmented; ultimate segment subequal to preceding three together. Pronotum pale brown or brown; scutum yellowish, with four brown vittæ, a triangular brown cloud on caudal area; scutellum yellow; postscutellum brown; pleural and sternal sclerites pale brown or brown; pleural membranes yellow. Legs as in male in color, proportional length of their segments as follows: 33 : 39 : 33 : 16 : 12 : 9 : 7 in foreleg, 36 : 42 : 34 : 17 : 12 : 8 : 7 in middle leg, and 34 : 44 : 48 : 26 : 21 : 14 : 9 in hind leg. Abdomen yellow in ground color; each tergum with a narrow brown anterior band or uniformly brown; cerci (Plate 2, fig. 26) small, yellow; spermathecæ (Plate 2, fig. 27) spherical, each with hyaline neck region.

Specimens.—Alcoholic male and females; Taihoku, Formosa; November 16, 1924; Karo, Tottori Prefecture; July 3 to 5, 1931; Toba, Mie Prefecture; August 6, 1934; deposited in the entomological laboratory, Kyoto Imperial University; collected by Dr. R. Takahashi and M. Tokunaga.

According to Kieffer the development of the beards of the male tarsus differs greatly among specimens from the same locality. Edwards (1931)[1] said that Kieffer's *Procladius formosanus* of Formosa is also the same species, the wings having been wrongly described as bare.

Genus ANATOPYNIA Johannsen

Including *Macropelopia* THIENEMANN and *Psectrotanypus* KIEFFER.

There are about five species of this genus, and they are distinctly specific in the coloration of the wings.

[1] Edwards, F. W., Diptera of Patagonia and South Chile, pt. 2 (1931) 239.

Key to the Japanese species of Anatopynia.

1. Legs with pulvilli ..... 2.
   Legs without pulvilli ..... 3.
2. Two median scutal vittæ distinct being dark..... *A. varia* Fabricius.
   Two median scutal vittæ indistinct being yellowish.
   A. yoshinarai sp. nov.
3. Wings with dark markings on cell R_5 ..... 4.
   Wings without dark markings on cell R_5..... 5.
4. Wings with crossveins dark..... *A. nebulosa* Meigen.
   Wings with crossveins pale..... *A. kibunensis* sp. nov.
5. Wings without dark spots at ends of radial veins.
   A. goetghebueri Kieffer.
   Wings with dark spots at ends of radial veins..... *A. japonica* sp. nov.

ANATOPYNIA VARIA Fabricius.

Anatopynia brevicalcar KIEFFER is a synonym.

This fly is very abundant at Kyoto in the early spring. The immature forms are found on the muddy bottoms of still waters.

Male.—Body 3.8 to 9.5 mm in length, brown or pale brown in ground color; thorax with distinct dark brown vittæ; wings darkly clouded, with white patterns. Antennæ 15-segmented, with scapes and plumose hairs dark brown, flagellum pale brown; antennal ratio about 2.2; maxillary palpi 4-segmented (5 : 11 : 16 : 22). Thorax brown, with four dark brown scutal vittæ; scutellum pale brown. Legs pale brown, with knee joints darker; relative lengths of segments of foreleg, excepting proximal two segments, as follows: 92 : 112 : 73 : 38 : 28 : 17 : 11; that of middle leg 105 : 103 : 56 : 27 : 20 : 12 : 9; that of hind leg 97 : 114 : 82 : 46 : 32 : 20 : 11; tarsal spurs absent; both pulvilli and empodium large; claws simple. Halteres yellowish brown. Wings as in Plate 3, fig. 38. Abdomen pale brown; typically each segment with two brown setigerous bands, anterior band broader at meson, posterior band interrupted at meson; posterior four segments darker than anterior. Hypopygium dark brown; coxite with a blunt basal elevation; style slender, with a black apical spine (Plate 3, fig. 56).

Female.—Body length 3.2 to 7.2 mm; color as in male; abdominal segments without posterior bands. Antennæ 15-segmented, rarely 14-segmented; ultimate segment shorter than preceding three segments (54.4 : 73.9), but slightly longer than two segments together (54.4 : 51.3), with a small apical and several long basal setæ, antennal ratio varying from 0.18 to 0.21. Relative lengths of segments of legs as follows: 77.4 : 100.2 : 59 : 28.8 : 20.2 : 13.4 : 9 in foreleg, 97 : 91.8 : 43.8 : 21.8 : 15.6 : 10.2 : 8 in middle leg, and 86.2 : 99.4 : 65.8 : 35 : 25.5 : 16.8 : 9.5

in hind leg. Wings broader and darker than in male. Cerci somewhat rectangular; spermathecæ brown, with neck region (Plate 3, figs. 51 and 52).

Pupa.—Exuviæ 6 to 7.2 mm in length, brown; abdomen paler or hyaline on lateral parts. Thorax with several isolated setæ on tergum: one pair on pronotum, two on meson of mesoscutum, one cephalad of wing bases, one on scutellum. Prothoracic respiratory organs dark brown, straight, elongate, distinctly depressed, imbricate, with semicircular terminal part (Plate 1, fig. 13). Abdomen with characteristic marking on first tergum (fig. 12); chætotaxy of abdominal segments as follows: On tergum, first segment with a long seta on each laterocephalic part, three pairs of long setæ on posterior plate, and two setæ on each lateral margin (fig. 12), segments from second to fifth each with three pairs of long and two pairs of small setæ on caudal part, one pair of minute setæ on cephalic marginal thickening, and one slender seta on each laterocaudal part (fig. 10), sixth and seventh each with three pairs of small caudal setæ (fig. 11), other caudal segments without dorsal setæ; on sternum, from first to sixth each segment with three pairs of distinct setæ along caudal margin and one pair of minute setæ on cephalic marginal thickening (fig. 10), seventh with caudal setæ somewhat different in arrangement from preceding segment, median two pairs being set longitudinally (fig. 11), remaining segments without ventral setæ. Lateral swimming hairs, which are flattened and very long, only found on segments seventh, eighth, and ninth; five or six setæ on each lateral margin of seventh, five on eighth, and two on cephalic part of lateral swimming paddle of ninth segment. Each ultimate swimming paddle large, elongate, sharply pointed, fringed with delicate setæ basally and finely serrulate apically (figs. 14 and 15). Sheaths of genitalia of male elongate, a little longer than united part of paddles, while those of female very short, about half as long as united part.

Larva.—Body 8 to 9 mm in full-grown state, semihyaline, green or reddish green, with a delicate setal line on each side from prothorax to eighth abdominal segment, with large caudal tufts of hairs. Head brown; frontal sclerite very broad; chætotaxy as follows: Two pairs of setæ on cephalic part of frontal sclerite, three on dorsal side of each vertex dorsad of eye spot, and four on ventral side of each vertex caudomesad of eye spot; these setæ of head all simple, unbranched. Antennæ 4-segmented, basal segment very long, about six times as long as following three segments together, with a large sensory pore

on distal part, with bifid trichoid organ (Nebenborste and Blattborste) on distal membrane, second segment slender, with two sensory projections on laterodistal end; third segment minute, chitinized; fourth minute, conical, not chitinized (Plate 1, fig. 3). Clypeolabrum (fig. 2) membranous, several chitinized plates and various sensory organs; a narrow elongate plate of postclypeus on the dorsal side with a long simple hair at each lateral end, paired narrow plates (labraliæ?) ventrad of dorsal plate bare, a small narrow plate of preclypeus ventrad of paired plates also bare; membranous areas among these chitinized plates bluntly elevated: a dorsal narrow area just ventrad of dorsal plate bare, paired areas just ventrad of paired plates each with two trichoid sensillæ, a large membranous area of labrum proper ventrad of small plate with a pair of trichoid sensillæ and four pairs of peglike sensillæ; besides the above-mentioned sensillæ there are two pairs of porelike sensillæ just laterad of two narrow plates. Premandibles absent. Labium (Plate 1, fig. 6) consisting of a pair of serrate plates of mentum, each of which is provided with six to eight (usually seven) teeth, a small ventral lobe, which is a very thin structure and varies in shape in different specimens from trilobate to quadrilobate, a large dorsal lobe of labium proper, which arises from dorsal side of serrate plates, is constricted three parts and provided with a slightly chitinized longitudinal middorsal area and a very finely pubescent tip. Mandible (Plate 1, fig. 4) slender, with seven, varying from five to seven, lateral teeth including minute basal teeth, a long hyaline projection at base of apical tooth, two slender setæ and two porelike sensillæ on dorsal side. Hypopharynx (figs. 1 and 5) complicated in structure, mainly consisting of several chitinized plates and paired membranous lobes surrounding salivary cavity; a ventral thickly chitinized plate of salivia which is definitely serrate into four equal teeth, paired finely serrulate hyaline plates just laterad of salivia also applied on ventral side of hypopharyngeal projection, dorsal paired minutely serrulate narrow plates of hypopharynx proper applied on dorsal side of salivos and each with about eighteen teeth (varying from fifteen to twenty-one); these structures all supported basally by a fused pharyngea-lingulæ which is thickly chitinized and provided with three muscles at each lateral end; these muscles extending in different directions: one dorsocephalad, one straightly dorsad, and one caudoventrad; between salivia and hypopharynx proper there provided with paired membra-

nous lobes laterad of salivos, this lobe with four small sensillæ on distal end and two isolate sensillæ on dorsodistal surface. Cervix with a pair of slender setæ on ventral side. Throughout thorax and abdomen, excepting marginal setæ and caudal tufts of hairs, without distinct setæ; prothorax with typical pseudopods and two pairs of small setæ laterad of pseudopods; marginal setæ of thoracic region far smaller than in abdominal region. Abdominal lateral setæ well developed on segments from first to eighth; penultimate segment with two pairs of small setæ on laterodorsal side and paired large caudal tufts of hairs each of which consists of an elongate basal stem and about twenty long setæ (varying from fifteen to twenty); ultimate segment with a minute conical middorsal projection, three small setæ on each laterodorsal side, and two pairs of pointed anal gills; posterior pseudopods elongate, each with a small seta at middle and crowned with fifteen nonserrate hooklets (Plate I, fig. 9).

Specimens.—Alcoholic males and females; Kyoto: Kitashirakawa, June 25, 1930, April 17, 1931, March 20 and April 7, 1932; Kibune, July 10, 1932; Miyake-Hachiman, July 2, 1936; Shiga, Mount Ryozen, June 3, 1930; Tottori, Mount Daisen, July 2, 1931; deposited in the entomological laboratory, Kyoto Imperial University; collected by Miss T. Ueno and M. Tokunaga.

According to Thienemann and Zavrel the immature forms of the present species belongs to the first type of the Tanypodinæ. The morphological terminology of the mouth parts of the larvæ used in this report and in those of Thienemann and Zavrel, may be compared as follows: Labrum proper, postclypeus, preclypeus, and labralia are termed "labrum" collectively; labium proper and mentum are termed "labium" collectively and the latter is termed "Paralabial-Kämme" of labium; salivia is termed "glossa;" hypopharyngeal lobe is termed "palpus hypopharyngealis;" hypopharynx proper is termed "Zahnleiste" of hypopharynx; differences in the other terms used are negligible.

ANATOPYNIA YOSHIMURAI sp. nov.

This fly was collected at the margin of stagnant water in Kyoto.

Female.—Body about 3.5 mm in length, yellow in ground color, with two yellowish brown lateral scutal vittæ; wings with characteristic dark bands.

Head with vertex brownish yellow; mouth parts and antennæ uniformly pale brownish yellow. Antennæ 15-segmented. Thorax yellow in ground color; scutum with two yellowish brown lateral vittæ and three pale brownish yellow lines on

cephalic area; scutellum yellow; postscutellum yellow, pale brownish on caudal margin; legs entirely pale brownish yellow; femora very obscurely brownish before yellow ends; both pulvilli and empodium present; relative lengths of segments of middle legs 97 : 100 : 56 : 26 : 19 : 14 : 9. Wing with two distinct dark transversal bands, crossveins and first section of M_{3+4} hyaline (Plate 3, fig. 39). Abdomen white in ground color; each segment, from second to eighth, with a pale brown median spot and two anterior pale brownish yellow clouds; hypopygium white, cerci as in Plate 3, fig. 54; spermathecæ yellowish, each with a distinct neck region (Plate 3, fig. 55).

Habitat.—Honshu, Japan.

Holotype.—Alcoholic female; Uzumasa, Kyoto; July 9, 1934; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. Y. Yoshimura.

This beautiful fly is named in honor of the collector, Mr. Yoshihiro Yoshimura; it is allied to *Anatopynia ornata* Meigen, but is distinctly different in the position of the wing band; in the allied species the distal band occupies the distal one-third of the wing area.

ANATOPYNIA GOETGHEBUERI Kieffer.

This fly was collected at light.

Male.—Body length about 3.6 mm. Head with vertex dark brown; frontoclypeus and mouth parts brown; antennæ 15-segmented, with scapes and plumose hairs dark brown, flagellar segments brown; antennal ratio about 1.7. Thorax pruinose, yellowish brown in ground color; scutum with median vittæ brown, lateral vittæ dark brown; scutellum yellowish brown; postscutellum dark brown. Legs yellowish pale brown, with coxæ brown, femoral distal ends somewhat darkish preapically; proportional lengths of segments of legs 60 : 75 : 58 : 27 : 19 : 12 : 9 in foreleg, 66 : 67 : 40 : 19 : 14 : 10 : 8 in middle leg and 60 : 75 : 55 : 26 : 20 : 13 : 9 in hind leg; pulvilli absent. Wing (Plate 3, fig. 37) with a distinct dark central spot on crossvein and basis of radial fork; distal one-third very slightly darkish. Abdomen yellowish brown, each tergum with a dark band along anterior margin; hypopygium as in Plate 3, fig. 48.

Female.—Body length about 3.2 mm, pale brown in ground color; thorax with four distinctly separated vittæ; wing with only a dark distinct central spot on crossvein. Head with vertex and mouth parts brown; antenna with scape brown; pedicel and flagellum brown, but basal part of each interme-

diate flagellar segment white; ultimate segment slightly shorter than preceding three segments together (60 : 63); antennal ratio about 0.2. Lateral scutal vittæ black; median vittæ short, brown at cephalic half and black at caudal half; scutellum and postscutellum pale brown. Legs uniformly brown; relative lengths of segments of legs 72 : 90 : 63 : 30 : 20 : 14 : 10 in foreleg, 90 : 86 : 49 : 24 : 16 : 10 : 9 in middle leg, and 72 : 94 : 70 : 33 : 25 : 16 : 11 in hind leg; pulvilli absent. Haltere white. Abdominal segments pale brown, each with a brown anterior band which triangularly extends caudad along middorsal line, narrowly white along caudal margin; penultimate segment entirely pale brown; ultimate, including cerci, white; spermathecæ pale brown, spherical, each with a very short neck region (Plate 3, fig. 49); cerci as in Plate 3, fig. 50.

Specimens.—Alcoholic male and female; Kyoto: Shimogamo, May 18, 1930, and Miyake-Hachiman, July 2, 1936; deposited in the entomological laboratory, Kyoto Imperial University; collected by Miss T. Ueno and M. Tokunaga.

ANATOPYNIA NEBULOSA Meigen.

This is a large dark species which is often captured in the late autumn and early spring.

Female.—Body 5 to 6 mm in length. Head dark brown; appendages brown; antennæ 15-segmented; ultimate segment subequal in length to preceding four segments together; antennal ratio varying from 0.24 to 0.31. Thorax reddish brown, with three black scutal vittæ which are separated by pruinose lines; caudoscutal area dark brown; scutellum brown or somewhat paler; postscutellum black. Legs with coxæ reddish brown, trochanters and femora yellowish brown, tibiæ and tarsi brown or reddish brown, distal ends of tibiæ black; proportional lengths of segments of legs as follows: 92.7 : 123.3 : 84.7 : 50 : 32.7 : 23 : 16.3 in foreleg, 109.7 : 122 : 67.3 : 36 : 29.7 : 18 : 13.5 in middle leg, and 101.3 : 147 : 87.3 : 51.3 : 35.3 : 21 : 15.5 in hind leg. Wing as in Plate 2, fig. 23. Haltere white. Abdomen reddish brown, each segment with broad cephalic dark band; cerci (Plate 3, fig. 47) somewhat rectangular, yellow; spermathecæ (fig. 46) reddish brown, each with a short neck region.

Specimen.—Alcoholic females; Kibune, Kyoto, March 10 and May 7, 1932; Tsuta, Aomori, October 14, 1935; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

ANATOPYNIA KIBUNENSIS sp. nov.

This was collected at Kibune, Kyoto, in spring.

Female.—Body length about 4.2 mm. Head brown on vertex, pale brown on frontal aspect, mouth parts pale brown; antenna with scape and ultimate segment brown, other segments pale brown, 15-segmented; antennal ratio about 0.25; ultimate segment with an apical and two basal setæ. Thorax brown in ground color; scutum pruinose, with middle vittæ dark brown and lateral vittæ black, shoulder parts pale brown; scutellum and postscutellum brown; pleural membranes yellow. Legs with coxæ brown, trochanters pale brown; femur broadly brown at basal three-fourths, yellowish at both ends, dark brown preapically; tibia largely pale brown, dark brown at end; tarsus largely pale brown; pulvilli absent; relative lengths of segments of legs 95 : 119 : 82 : 45 : 33 : 21 : 16 in foreleg, 105 : 114 : 65 : 34 : 25 : 16 : 13.5 in middle leg, and 95 : 134 : 81 : 45 : 34 : 20 : 14 in hind leg. Wing resembling that of the preceding species (Plate 3, fig. 35). Abdomen entirely pale brown or brown; last segment, including cerci, yellowish white.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic female; Kibune, Kyoto, March 10, 1932; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This fly closely resembles *Anatopynia nebulosa* Meigen, but is easily distinguished by the yellow knee joints, pale crossvein and first section of M_{3+4}, and absence of a darkish cloud of the wing margin.

ANATOPYNIA JAPONICA sp. nov.

This fly was captured at a window.

Male.—Body about 3.5 mm in length, pale brownish yellow in ground color. Head with vertex brown, mouth parts and frontoclypeus pale brown; antennæ with scape brown, flagellum pale brown, 15-segmented; antennal ratio about 1.75. Thorax with four distinct yellowish brown vittæ on yellow scutum; scutellum yellow; postscutellum yellowish brown. Legs uniformly pale brown; knee joints somewhat darker; pulvilli and tarsal spurs absent; proportional lengths of segments of legs 75 : 93 : 67 : 32 : 22 : 14 : 9 in foreleg, 84 : 86 : 49 : 24 : 17 : 11 : 8 in middle leg, and 76 : 94 : 67 : 32 : 22 : 15 : 9.5 in hind leg. Halteres white. Wing (Plate 3, fig. 36) with three small dark spots at ends of three radial branches besides dark central spot over

crossvein and first section of M_{3+4}. Abdominal segment brown on cephalic half and yellow on caudal half; coxite and style as in Plate 3, fig. 53.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic male; Hachijo, Kyoto, June 15, 1930; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This is closely related to *Anatopynia nugax* Walker, but in the allied species the leg ratio of the foreleg is 1.25, the wing is not provided with three dark spots at the ends of the radial veins, and the proximal two segments of the hind tarsus are provided with apical spurs.

Genus PENTANEURA Philippi

Including *Ablabesmyia* JOHANNSEN, *Isoplastus* SKUSE, *Pelopia* MEIGEN, and *Micropelopia* THIENEMANN.

This comparatively large genus includes a dozen or more Japanese species. The majority of these species are distinctly specific being provided with characteristic wing markings. They may be easily distinguished by the following key:

Key to the Japanese species of Pentaneura.

1. M_{3+4} ending far beyond level of end of R_{4+5} ..... *P. minuta* sp. nov.
   M_{3+4} ending before level of end of R_{4+5} ..... 2.
2. Wing with markings ..... 3.
   Wing without markings ..... 7.
3. Tibia and first tarsal segment each with a dark median ring. *P. monilis* Linnæus.
   Tibia and first tarsal segment without median rings ..... 4.
4. Postscutellum whitish or yellowish ..... *P. ortopunctata* sp. nov.
   Postscutellum brownish or darkish ..... 5.
5. Wing with at least one transversal band ..... 6.
   Wing without complete transversal band ..... *P. monticola* sp. nov.
6. Wing with one transversal band ..... *P. fuscicava* Kieffer.
   Wing with two transversal bands ..... *P. maculipennis* Zetterstedt.
7. Postscutellum whitish or yellowish ..... 8.
   Postscutellum brownish or darkish ..... 10.
8. Mesoscutum with dark or brown spots ..... 9.
   Mesoscutum without dark or brown spots ..... *P. alba* sp. nov.
9. Mesoscutum with eight dark spots ..... *P. japonica* sp. nov.
   Mesoscutum with four dark spots ..... *P. melanops* Meigen.
10. R_{2+3} incomplete, atrophied before costal margin ..... 11.
    R_{2+3} complete, ending on costal margin ..... 13.
11. Mesoscutal median vittæ distinct, as dark as lateral vittæ. *P. longipennis* sp. nov.
    Mesoscutal median vittæ indistinct, paler than lateral vittæ ..... 12.

12. First and second abdominal terga without bands..... *P. divisa* Walker.
First and second abdominal terga each with a dark band.
P. kyotoensis sp. nov.

13. Fourth abdominal tergum with a dark band..... *P. multifascia* sp. nov.
Fourth abdominal tergum without dark bands..... *P. gracillima* Kieffer.

PENTANEURA MINUTA sp. nov.

This may be one of the smallest species of the Tanypodinæ, usually less than 2 mm in body length.

Male.—Body length about 2 mm, ground color pale brown. Head with vertex brown, frontoclypeus and mouth parts pale brown, eyes pubescent, widely separated above from each other. Antennæ 15-segmented, with antennal ratio about 0.39. Maxillary palpi slender, 5-segmented (14 : 18 : 25 : 39 : 60). Scutum pale brown, with four brown vittæ, the median pair long reaching caudal margin of scutum; scutellum pale brown; postscutellum brown; pleuron and sternum uniformly pale brown. Legs also entirely pale brown; proportional lengths of segments as follows: 21 : 16 : 13 : 6 : 5 : 4 : 3 in foreleg, 28 : 16 : 21 : 9 : 6.5 : 4.5 : 4 in middle leg, and 25 : 22 : 24 : 11 : 8 : 5.2 : 4.2 in hind leg. Halteres pale brown. Wings (Plate 3, fig. 40) with two transversal veins located at basal one-fourth of wing length, without R_{2+3}, R_1 and R_{4+5} extending closely in contact with each other, R_{1+3} ending far before level of tip of M_{3+4}, proximal section of M somewhat atrophied. Abdomen entirely pale brown, with styles of hypopygium slender.

Female.—Body 1 to 1.2 mm in length, dark brown; abdomen short, oval; general appearance *Culicoides*-like.

Head blackish, with mouth parts pale brown. Antennæ pale brown, 12-segmented; ultimate segment shorter than preceding three segments together (24 : 27), with a long apical seta, four slender preapical sensory setæ, and several basal verticils; intermediate flagellar segments each with several long verticils and two long trichoid sensillæ; antennal ratio about 0.3. Maxillary palpi elongate, 5-segmented (1 : 2 : 5 : 6 : 10). Scutum dark brown, pruinose along foveæ, with four black vittæ; scutellum brown; postscutellum and pleural and sternal sclerites black; pleural membranes brown. Legs uniformly brown; proportional lengths of segments of foreleg 21 : 16 : 12 : 5 : 5 : 4 : 3.5; relative length of femur to tibia 30 : 17 in middle leg and 35 : 22.5 in hind leg (tarsi broken off). Halteres brown. Wings far broader than in male. Abdominal terga dark brown; sterna brown.

Habitat.—Honshu, Japan.

Holotype.—Male; Kibune, Kyoto; July 1, 1930.

Allotype.—Female; Uzumasa, Kyoto, October 29, 1934.

Paratype.—Female; Uzumasa, Kyoto; October 29, 1934.

Type specimens.—Alcoholic; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. Y. Yoshimura and M. Tokunaga.

This species is closely allied to *Pentaneura dubia* Meigen, in which, however, the male antennæ are 16-segmented, with the antennal ratio about 0.7, and the proportional length of the first tarsal segment to the tibia is 0.8 in the foreleg, 1.5 in the middle leg, and 1.1 in the hind leg in both sexes.

PENTANEURA MONILIS Linnæus.

Tanypus monilis, Linnæus, Philip. Journ. Sci. 18 (1921) 574; Ann. Soc. Linn. Lyon 69 (1922) 41.

This is widely distributed in the Northern Hemisphere and has been recorded from Anping, Taihoku, and Daitotei, Formosa. The adults of both sexes are very common at Kyoto, being captured at light almost throughout spring, summer, and autumn.

Male.—Body length 3 to 4.5 mm; coloration variable from pale brown to dark brown; wings with many irregular dark clouds; legs with many black rings.

Head with vertex yellowish brown, frontoclypeus yellow or pale brown. Antennæ 15-segmented, with scapes dark brown or black, flagellum pale brown; plumose hairs bicolored, proximal hairs pale brown, and distal hairs black; antennal ratio 2.09 (1.92–2.2). Scutum yellowish pale brown in ground color, with four reddish or dark brown vittæ; caudoscutal area dark brown; scutellum white; postscutellum brown or black; pleural and sternal sclerites dark brown; pleural membranes yellowish white. Legs yellowish white, with knee joints white; femur with a preapical dark ring, sometimes brownish on basal half; tibia with three dark rings, on basal, middle, and apical parts; first tarsal segment with two dark rings, on middle and apical parts; following two segments dark at each end; fourth segment dark brown at distal half or brown on basal half and black on distal half; ultimate tarsal segment entirely brown or black; tarsal spurs on proximal three segments of all legs; claws simple; empodium short; pulvilli absent; proportional lengths of segments as follows: 55.4 : 68.2 : 56.2 : 36.4 : 27 : 17.6 : 9 in foreleg, 63.8 : 62.2 : 48.2 : 29.6 : 22.4 : 14.8 : 8.6 in middle leg and 54.5 : 70.5 : 60.5 : 36.8 : 27.5 : 17.3 : 9 in hind leg; leg ratio

of three pairs as follows: 0.82 (0.77–0.87), 0.78 (0.73–0.83), and 0.86 (0.78–0.91), respectively. Halteres white. Wings (Plate 4, fig. 66) with many dark spots; crossveins h, r-m, m-cu, base of radial branches, and distal ends of three radial veins and their marginal areas black; dark brown clouds: two or three in cell R_5, two in M_2, two in M_4, and five or six in anal cell; first section of M_{3+4} hyaline. Abdomen usually whitish or yellowish; posterior five or three terga more or less brown at middle or at side or entirely clouded; hypopygium (Plate 4, fig. 80) with long slender styles, which are usually pubescent on proximal two-thirds and each provided with a chitinized apical projection and a preapical cuplike hyaline appendage.

Female.—Body 1.5 to 3 mm in length, coloration generally as in male. Antennæ with scapes dark brown, flagellum yellow or pale brown; 12-segmented; ultimate segment with an apical stylet, a short apical seta, and several long basal setæ; subequal in length to preceding three segments together (47.8 : 47.5); antennal ratio 0.28 (0.24–0.32). Scutal vittæ usually more distinct than in male, being reddish or dark brown on pale brown or yellow ground color. Legs with coloration as in male; proportional lengths of segments as follows: 45.9 : 52.9 : 43.6 : 26.7 : 19 : 13 : 7.9 in foreleg, 55.1 : 54.5 : 43.2 : 24.2 : 17.8 : 11.8 : 7.6 in middle leg, 49.1 : 65.2 : 55.8 : 31 : 22.6 : 14.6 : 8 in hind leg; leg ratio of foreleg 0.83 (0.79–0.85), of middle leg 0.8 (0.75–0.83), and of hind leg 0.86 (0.83–0.92). Halteres white. Wings with coloration as in male, relatively broader than in male. Abdomen entirely yellowish white or pale brown, with cerci (Plate 4, fig. 78) discoidal, spermathecæ (fig. 79) dark brown, broadly hyaline on basal one-third, spherical.

In darker specimens, which are often males, the thorax, including the scutellum, is dark brown or black; scutal vittæ indistinct in alcoholic specimens, pruinose areas along foveæ disappearing; abdomen mainly dark brown or black, several anterior terga paler along caudal margin; legs with broad black rings.

Specimens.—Alcoholic males and females; Kyoto: Shimogamo, September 6, 1929, May 19 and July 4, 1930; Hachijo, May 20 and 30 and September 6, 1930, July 6, 1931, and July 5, 1934; Arashiyama, October 2, 1930; Kibune, July 2, 1932, September 16, 1933, October 16, 1934; Yamashina, August 1, 1932; Uzumasa, July 9, 1934; Kitashirakawa, October 31, 1935; Seto, Wakayama Prefecture, June 26, 1930; Mount Daisen, Tottori Prefecture, July 2, 1931; Karo, Tottori Prefecture, July 3 to 5, 1931; Iyayama, Tokushima Prefecture, August 3, 1934; deposited

in the entomological laboratory, Kyoto Imperial University; collected by Messrs. Y. Yoshimura, M. Morishita, and M. Tokunaga.

Pentaneura semiglaber Kieffer is said to be provided with styles of the male hypopygium of which the distal half is bare; in Japanese specimens of *P. monilis*, however, some individuals show structures quite similar to those of *semiglaber*, besides close similarity of coloration, and some other individuals exhibit transitional characters from the former species. From these observations on 118 specimens, I am led to treat *P. semiglaber* Kieffer as a synonym of *P. monilis* Linnæus.

PENTANEURA OCTOPUNCTATA sp. nov.

The specimens of this whitish species were captured at light in Kyoto.

Male.—Body length 3.8 to 4 mm, yellowish white in ground color, with eight black spots on orange-yellow scutal vittæ.

Head uniformly yellow or whitish. Antennæ pale brown, with scapes yellow, plumose hairs yellow, 14-segmented, with a short apical seta; antennal ratio about 1.66. Thorax yellowish white or pure white in ground color; scutum with four orange-yellow or pure yellow vittæ and four pairs of black spots; one pair on anterior end of median vittæ, one pair on middle of median vittæ, one on anterior end of each lateral vitta, and one just caudad of each lateral vitta; postscutellum with a pair of pale brown or black spots in whitish ground color; each pleural side with two black spots or clouds: one just caudad of mesospiracle and the other larger one along dorsal side of episternal suture; sternal side yellow. Legs pale brownish white; knee joints distinctly black; empodium short; claws simple; pulvilli vestigial; relative length of segments 60 : 76 : 60 : 29 : 21 : 15 : 8 in foreleg, 68 : 65 : 39 : 19 : 13 : 10 : 6 in middle leg, and 60 : 80 : 64 : 29 : 21 : 13 : 7 in hind leg. Halteres white. Wings (Plate 3, fig. 42) with four black spots: one covering arculus and humeral crossvein; one covering base of radial branches, first section of $M_{3,4}$ and r-m; one covering end of R_1 and fork of R_{2+3}; and one covering end of R_{4+5}; squama with a dark spot. Abdomen yellow or pure white; first tergum sometimes with a pair of pale brown clouds; second without markings; terga from third to fifth each with a very narrow brownish band along cephalic margin; sixth tergum with a pair of small pale brown clouds along cephalic margin; seventh entirely brown or pale brown; eighth also entirely pale brown or white; ninth white,

with a pair of small caudal setigerous tubercles; hypopygium (Plate 5, fig. 91) brown; coxite broad, with a basal lobe; style stout setigerous.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic male; Hachijo, Kyoto; May 22, 1930.

Paratopotype.—Alcoholic male; Kitashirakawa, Kyoto; August 1, 1934.

Type specimens.—Deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This species is closely allied to *Pentaneura tripunctata* Goetghebuer, in which, however, the scutal markings are different, the male antennal ratio is about 1.33, and the style of the hypopygium is provided with only two preapical setæ.

PENTANEURA MONTICOLA sp. nov.

The only specimen of this fly was captured beside a stream.

Male.—Body length about 2.5 mm, ground color yellowish white; thorax with brown markings on orange-yellow scutal vittæ; abdomen yellowish white, with posterior two terga entirely brown; wings with two large pale brown clouds.

Head whitish yellow. Maxillary palpi pale brown. Antennæ brown, with plumose hairs brown, scapes yellow and pale brown on distal parts, 14-segmented; antennal ratio about 1.9. Thorax whitish yellow; scutum with four brown markings on orange-yellow vittæ: one pair of small spots on caudal part of median vittæ and one pair of long stripes along mesal margin of lateral vittæ; scutellum whitish; postscutellum brown; pleural membrane extensively whitish yellow; pleural and sternal sclerites mainly brown, yellow on a triangular area along ventral side of episternal suture. Legs with fore coxæ brown, middle and hind coxæ whitish; other segments all white. Halteres white. Wing (Plate 4, fig. 65) with veins white, two large pale brown clouds: one on distal part of wing and one beyond the middle of wing. Abdomen whitish yellow, somewhat brown due to hypocutaneous pigment; seventh and eighth terga brownish; hypopygium (Plate 4, fig. 77) whitish, with slender styles and coxites; style pubescent on basal half or more but without distinct setæ, not pubescent on distal half but with distinct setæ, with a strong apical spine.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic male; Ashiu, Kyoto; May 10, 1936; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This species somewhat resembles *Pentaneura maculipennis* Zetterstedt in the coloration of thorax and abdomen, but is distinctly different in wing markings and hypopygial structures.

PENTANEURA FUSCICLAVA Kieffer.

Tanypus fusciclava KIEFFER, Ann. Soc. Linn. Lyon 69 (1922) 40–41.

This species is found at Daitotei, Formosa.

Female.—Body about 1.2 mm in length, reddish brown in ground color, wing with a transversal band. Antennæ whitish, 12-segmented; ultimate segment brown, about twice as long as penultimate, with basal verticils. Scutum yellowish on anterior half, darker on posterior half, with brownish vittæ. Legs pale yellow; tibia of foreleg longer than first tarsal segment; pulvilli absent. Halteres with knobs dark brown, stems paler. Wings slightly brownish, with a brown band which covers apical part of Cu_1 and is enlarged caudad; costa not produced beyond end of R_{1+2}.

PENTANEURA MACULIPENNIS Zetterstedt.

Pentaneura subincurvatus GOETGHEBUER and *P. costalis* KIEFFER are synonyms and *P. laetus* MEIGEN and *P. muscicola* KIEFFER are probably synonyms.

This fly is common at Kyoto.

Male.—Body about 4 mm; ground color whitish yellow or white; head with a subtriangular black marking on vertex; scutum with four orange-yellow vittæ, with dark markings on these vittæ and along cephalic margin of scutum; wings with two dark bands; femur with black preapical ring.

Head whitish, with eyes and scapes black, frontoclypeus black or brownish; vertex with a subtriangular black marking on meson. Antennæ with flagellar segments whitish, plumose hairs bicolored: yellow on proximal hairs, black on distal hairs, 14-segmented; antennal ratio about 1.8. Thorax with ground color whitish yellow; scutum with four orange-yellow vittæ and dark markings: one pair of small markings on middle of median vittæ, one pair of long markings along lateral side of lateral vittæ, one pair of black spots just caudad of lateral vittæ, dark or dark brown marking along midcephalic margin of scutum; scutellum white, postscutellum black or dark brown; pleural and sternal sclerites black; pleural membranes extensively yellow; each pleural side with a triangular yellow marking above episternal suture. Legs, including coxæ, yellow; femur with a broad black preapical ring; distal three tarsal segments of foreleg somewhat darker; proportional lengths of segments

71 : 72 : 39 : 20 : 16 : 14 : 8 in foreleg, 69 : 85 : 70 : 38 : 26 : 19 : 10 in middle leg, and 66 : 94 : 70 : 40 : 30 : 20 : 10 in hind leg. Halteres white. Wing (Plate 3, fig. 41) with two dark bands: proximal one covering transversal veins, and distal one arising between ends of R_1 and R_2 and divergent caudad ending ends of Cu_1 and M_{3+4}; often a small brownish apical cloud. Abdomen mainly whitish yellow; first tergum unmarked; terga from second to sixth each with a narrow dark brown band along cephalic margin, some of these bands sometimes interrupted at middle; seventh and eighth broadly or entirely dark brown; ultimate segment whitish; hypopygium (Plate 5, fig. 88) whitish; styles sicklelike, angulated at middle.

Female.—Body 2.5 to 3 mm long, color as in male. Antennæ 12-segmented; scape whitish; ultimate segment pale brown, with several basal setæ, subequal to preceding three segments together (57 : 58–59); antennal ratio about 0.3. Relative lengths of segments of legs as follows: 60 : 76 : 61 : 31 : 22 : 15 : 9 in foreleg, 65 : 68 : 40 : 20 : 15 : 12 : 7 in middle leg, and 58 : 85 : 58 : 33 : 26 : 16 : 9 in hind leg. First and second abdominal terga, each with a pair of small brown lateral clouds on anterior half; third to sixth terga, each with three small brown clouds on anterior half; on seventh and eighth terga those clouds somewhat confluent; ultimate tergum whitish; cerci (Plate 4, fig. 58) white, subtriangular; spermathecæ (fig. 57) short, oval, brown, with broad hyaline basal portion.

Specimens.—Alcoholic males and females: Kyoto: Shimogamo, March 7 and May 18, 1930; Hachijo, September 29, 1930 and May 16, 1932; Arashiyama, October 2, 1930; Kibune, March 5, 1931; Kitashirakawa, September 30, 1934 and November 31, 1935; Yamashina, October 18, 1935; Nishigamo, December 15, 1935; and Mount Ryozen, Mie Prefecture, June 3, 1930; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. T. Kani and M. Tokunaga.

The male Japanese specimens differ from the descriptions based on European specimens in having the wing markings more extensive, antennal ratio less than 2, and the abdominal bands more complete.

PENTANEURA ALBA sp. nov.

Male.—Body length 2.3 to 2.7 mm, entirely yellowish white. Head with eyes bicolored, dorsal half, pale brown and ventral half, dark brown. Antennæ entirely yellowish white. Thorax white; scutellum without vittæ or with yellow lateral vittæ.

Legs entirely white; tibiæ of middle leg longer than first tarsal segment (68 : 40). Wings without colored markings; costa slightly produced beyond end of R_{4+5}; R_{2+3} atrophied on distal portion; R_{4+5} twice as long as R_1. Abdomen entirely yellowish white; hypopygium (Plate 4, fig. 74) slender; with straight styles.

Female.—Body length 2 to 2.5 mm. Antennæ 12-segmented; ultimate segment with a few (3 or 4) basal setæ, subequal in length to preceding three segments together (56.7: 55.3); antennal ratio 0.3 (0.28–0.33). Tibia of middle leg longer than first tarsal segment (63.7 : 36.3). Wings (Plate 4, fig. 64) with costa slightly produced, R_{2+3} complete and fored or atrophied before end. Cerci (fig. 76) produced ventrad; spermathecæ (fig. 75) yellow, oval.

Habitat.—Honshu, Japan.

Holotype.—Male; Mount Atago, Kyoto; May 31, 1931.

Allotype.—Female; Kurama, Kyoto; October 23, 1932.

Paratypes.—Male and females; Kyoto: Mount Atago, May 31, 1931; Kurama, October 23, 1932; Kibune, October 16, 1934; and Iyayama, Tokushima Prefecture; August 3, 1934.

Type specimens.—Alcoholic; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. M. Morishita and M. Tokunaga.

This fly is somewhat similar to *Pentaneura binotata* Wiedemann and *P. melanops* Meigen, but in *binotata* the bases of the sixth and seventh abdominal terga are somewhat dark and in *melanops* the seventh abdominal tergum is darker; the styles of the male hypopygium are also distinct in each species.

PENTANEURA JAPONICA sp. nov.

Female.—Body about 2.5 to 3 mm long, entirely white, with eight black spots on scutum. Antennæ 12-segmented, white; ultimate segment yellowish, subequal to preceding four segments together (59 : 61), without basal setæ; antennal ratio about 0.32. Thorax white; scutum sometimes with four pale yellow vittæ; dark spots: two pairs on cephalic and caudal ends of median vittæ, one pair on cephalic end of lateral vittæ, and one pair just caudad of lateral vittæ. Halteres, legs, and abdomen entirely white. Proportional lengths of segments of legs 53 : 72 : 56 : 30 : 21 : 16 : 9 in foreleg, 60 : 68 : 38 : 19 : 15 : 12 : 6.5 in middle leg, and 53 : 79 : 57 : 32 : 25 : 16 : 9 in hind leg. Wings (Plate 4, fig. 63) without markings. Cerci (Plate 4, fig. 72)

somewhat rectangular; spermathecæ (fig. 73) spherical, pale yellow.

Habitat.—Honshu, Japan.

Holotype.—Female; Arashiyama, Kyoto; October 2, 1930.

Paratype.—Female; Kitashirakawa, Kyoto; August 15, 1928.

Type specimens.—Alcoholic; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This fly is closely allied to *Pentaneura melanops* Meigen, but differs in color and antennal structures: in *melanops* the thorax has four black spots and the antennæ antennal ratio is less than 0.3; the ultimate segment is shorter than the preceding three segments together.

PENTANEURA MELANOPS Meigen.

Pentaneura bicolor FRIES and *P. interseptus* WALKER are synonyms.

This species is common in Japan.

Male.—Body 4 to 4.5 mm in length, yellowish white; thorax with four black spots. Antennæ with scapes yellow, flagellum and plumose hairs pale brownish yellow, 14-segmented; antennal ratio about 1.9. Thorax yellowish white; scutum with four black spots arranged transversally, sometimes with four yellow vittæ; postscutellum sometimes pale brown. Legs entirely yellowish white; proportional lengths of segments 67 : 83 : 68 : 35 : 25 : 18 : 9 in foreleg, 70 : 68 : 42 : 20 : 15 : 13 : 7 in middle leg, and 65 : 94 : 66 : 35 : 27 : 18 : 9 in hind leg. Wings (Plate 4, fig. 62) without markings. Abdomen yellowish white, terga with faint pale brown clouds along cephalic margins; these clouds in some specimens forming bands; seventh tergum broadly clouded; hypopygium (Plate 5, fig. 89) brown; coxite with a basal setigerous lobe; style distinctly angulated beyond middle, sicklelike.

Female.—Body length 2.2 to 4 mm. Antennæ 12-segmented; ultimate segment with several basal setæ, shorter than preceding three segments together (62 : 73); antennal ratio about 0.25. Tibia of middle leg far longer than first tarsal segment (90 : 52). Abdomen entirely white; cerci (Plate 4, fig. 69) somewhat triangular; spermathecæ (fig. 68) oval, hyaline. In some specimens scutum with four yellow vittæ and postscutellum yellow.

Specimens.—Alcoholic males and females; Kyoto: Kitashirakawa, August 15, 1928; Shimogamo, May 18, 1930; Hachijo, May 22, 1930; Nishigamo, April 10, 1932; Uzumasa, October 11,

1932; Kurama, October 23, 1932; Kibune, October 16 and November 3, 1934; and Gotemba, Shizuoka Prefecture, May 24, 1932; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. N. Omori and M. Tokunaga.

PENTANEURA LONGIPENNIS sp. nov.

Male.—Body length about 4.2 mm, yellowish brown in ground color, with four brown distinct scutal vittæ.

Head with vertex brown, other parts, including mouth parts, yellowish brown. Antennæ 14-segmented, uniformly pale brown, with antennal ratio about 1.7. Thorax yellow in ground color; scutum with four brown vittæ; postscutellum brown; pleural sclerites yellowish. Legs uniformly pale brown; relative lengths of segments of legs 70 : 82 : 61 : 40 : 28 : 17 : 10 in foreleg, 77 : 82 : 41 : 32 : 22 : 13 : 9 in middle leg and 68 : 98 : 64 : 44 : 31 : 17 : 10 in hind leg. Halteres white. Wings (Plate 4, fig. 60) with R_{2+3} atrophied distad. Abdomen yellow; terga from second to six each with a brown band on anterior half, seventh and eighth uniformly brown; hypopygium (Plate 5, fig. 85) yellowish, slightly brown on lateral sides of coxites; styles small, slender, straight.

Female.—Body 2.5 to 3.5 mm, coloration generally as in male. Antennæ 12-segmented; ultimate segment with four long basal setæ, shorter than preceding three segments together (62.5 : 68.5); antennal ratio 0.27 to 0.29. R_{2+3} forked, but atrophied beyond this point; costa more produced than in male. First abdominal tergum somewhat clouded; cerci (Plate 4, fig. 70) yellow; spermathecæ (fig. 71) spherical, brown, with hyaline basal portion.

Habitat.—Honshu, Japan.

Holotype.—Male; Kibune, Kyoto; August 13, 1931.

Allotype.—Female; Kurama, Kyoto; October 23, 1932.

Paratype.—Female; Kurama, Kyoto; October 23, 1932.

Type specimens.—Alcoholic; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

The present species resembles *Pentaneura nigropunctata* Staeger and *P. signatipennis* Kieffer. In the former allied species antennal ratio of the male is less than 1.5, but a little larger than 1, and in the latter species the costa is not produced beyond the end of R_{4+5}, and the tibial spurs are comparatively large and different in structure.

PENTANEURA DIVISA Walker.

This species was collected at the base of Mount Fuji in spring.

Male.—Body 2.5 to 3.5 mm in length, yellowish white, with lateral vittæ, but without median vittæ on scutum. Head yellow or yellowish brown. Antennæ yellowish brown, 14-segmented; antennal ratio 1.6. Thorax yellowish white; scutum with brown lateral vittæ and small pale brown clouds on cephalic half and caudal part; postscutellum brown. Legs pale brown; proportional lengths of segments of middle leg 63 : 60 : 49 : 26 : 16 : 11 : 7. Halteres white. Wings (Plate 4, fig. 59) with costa slightly produced, R_{2+3} atrophied at distal part, its fork obscure. Abdomen yellowish white, first tergum with a pair of faint pale brown clouds; second without markings; third and fourth each with a broad brown cephalic band; fifth with a faint pale brown median cloud; the following three broadly or entirely brown; hypopygium (Plate 5, fig. 86) slender, brown, with styles very long and pubescent at base.

Specimens.—Alcoholic males; Gotemba, Shizuoka Prefecture; May 24, 1932; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. N. Omori.

The Japanese specimens seem to be somewhat paler than the European specimens, especially in the color of the thoracic region. In a small male specimen from the same locality, the pale brown clouds of the first and fifth terga disappear, being entirely yellow, and the penultimate segment of the antenna is abnormally short, the antennal ratio being only 0.83.

PENTANEURA KYOTOENSIS sp. nov.

Male.—Body about 3 mm long, ground color yellow; thorax with scutal vittæ; abdomen with many pale brown bands; wings unmarked.

Head yellow, with vertex pale brownish yellow. Antennæ 15-segmented, with scapes brownish yellow, flagellar segments pale brown, with a short apical seta on terminal stylet; antennal ratio about 1.4. Thoracic ground color yellow; pronotum pale brownish yellow; scutum yellow, with two brownish yellow median and two brown lateral vittæ, cephalic margin brown; scutellum yellow; postscutellum pale yellowish brown; pleural and sternal sides extensively yellow; cephalic sclerites of notepisternum and epimeron brown. Legs entirely yellow; tibial spurs of middle leg distinctly unequal: larger one more than four times as long as the other, which is only vestigial. Hal-

teres yellow. Wings (Plate 4, fig. 61) with R_{2+3} atrophied beyond its fork; costa not produced. Abdomen yellow, with pale brown bands on terga; first tergum with a caudal band; second to fourth each with a broad band on cephalic half; fifth with a narrow cephalic band; sixth almost entirely pale brown; seventh with a subtriangular cloud on cephalic half; eighth entirely pale brown; ninth yellow; hypopygium (Plate 5, fig. 87) yellow, slender; styles straight, about two-thirds as long as coxites, pubescent on basal half.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic male; Uzumasa, Kyoto; October 11, 1934; deposited in the entomological laboratory, Kyoto Imperial University; collected by Mr. Y. Yoshimura.

This is closely allied to *Pentaneura divisa* Walker, but different in the coloration of the abdominal terga, the relatively short styles of the male hypopygium, and the proportional length of the tibial spurs of the middle leg.

PENTANEURA MULTIFASCIA sp. nov.

This fly is common at Kyoto in spring near still water.

Male.—Body 4 to 5 mm long, yellow in ground color; thorax with three distinct vittæ; wing without markings; abdominal terga with dark brown bands.

Head, including mouth parts, brown. Antennæ with scapes reddish brown, flagellar segments brown, plumose hairs brown, 15-segmented; antennal ratio about 2.1. Thoracic ground color yellow; pronotum pale brown; scutum yellow, with a median vitta reddish brown on cephalic half and dark brown on caudal half, two lateral vittæ dark brown; scutellum yellow; postscutellum black; pleural and sternal sclerites reddish brown, with membranes yellow. Legs entirely pale brown, with beards on fore tarsi; proportional lengths of segments of fore and hind legs 80 : 98 : 77 : 39 : 29 : 20 : 11 and 77 : 105 : 71 : 41 : 31 : 20 : 11, respectively. Halteres yellow. Wings (Plate 3, fig. 43) with costa slightly produced beyond end of R_{1+2}. Abdominal segments yellow in ground color; terga with a dark brown band on each cephalic region; first without band; from second to sixth each with a band; seventh dark brown on cephalic half and brown on caudal half; following two terga entirely brown; ninth tergum with a pair of minute setigerous tubercles; hypopygium (Plate 5, fig. 90) dark brown; coxites broad; styles curved, sicklelike, almost entirely pubescent, with a terminal seta and strong spine.

Habitat.—Honshu, Japan.

Holotype.—Male; Nagaoka, Kyoto; April 6, 1936.

Paratypes.—Males; Kyoto; Kitashirakawa, March 31, 1932; Nishigako, April 10, 1932; Nagaoka, April 5, 1936.

Type specimens.—Alcoholic; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This species somewhat resembles *Pentaneura melanura* Meigen, *P. setiger* Kieffer, and *P. falciger* Kieffer, but these allied species are all provided with slenderer and less-curved styles of the hypopygium.

PENTANEURA GRACILLIMA (Kieffer).

Pelopia gracillima KIEFFER, Ann. Mus. Nat. Hung. 14 (1916) 102.

This fly was collected at Takao, Formosa, by Sauter.

Male.—Body about 2.5 mm in length, whitish in ground color. Head reddish brown. Antennæ brownish white, with scapes reddish brown; 14-segmented; penultimate segment twice as long as preceding eleven segments together; plumose hairs gray. Scutum with three reddish vittæ, which are more or less confluent; postscutellum and pleural and sternal sclerites reddish. Legs whitish, without clouds; fore tibia one and one-half times as long as first tarsal segment; hind tibia slightly longer than first tarsal segment. Halteres white. Wings hyaline; costa produced beyond tip of R_{1+5}; r-m at fork of M; m-cu very short, almost absent. Abdomen whitish; cephalic three terga each with a dark brown band; fourth without markings; caudal three terga entirely dark brown; hypopygium white; styles slender, long reaching bases of coxites, bare, gradually curved.

DIAMESINÆ

After the publication of my previous paper (1936) which included about sixteen species, I found several species of this subfamily from Honshu, including the curious genus *Heptagyia* Philippi.

DIAMESA (DIAMESA) PLUMICORNIS Tokunaga.

Since the publication of the description of the male of this fly in my previous report, part VI of the chironomid series, I have collected one specimen of each sex at Kibune, Kyoto.

Female.—Body about 4.8 mm in length, black in ground color, thorax highly pruinose in white along pseudosutural foveæ, pronotum setigerous at side.

Head entirely black; antennæ 8-segmented (20 : 37 : 23 : 23 : 19 : 19 : 18 : 63), ultimate segment longer than preceding three together (63 : 58), with two apical and two basal setæ; antennal ratio about 0.48. Thorax with black scutal vittæ separated by pruinose lines (in alcoholic specimen entirely black); scutum setigerous along foveæ, its setæ arising from distinct punctures of integument. Legs entirely black, with tarsal spurs on ventral sides and tips of proximal two segments of all legs; claws simple; empodium elongate; fourth tarsal segment obcordate; proportional lengths of segments of foreleg 82 : 98 : 67 : 32 : 19 : 8 : 9, those of middle leg 90 : 90 : 40 : 21 : 14 : 7 : 7.5, those of hind leg 99 : 103 : 63 : 36 : 19 : 7 : 8. Halteres white. Wings (Plate 5, fig. 84) dark brown under transmitted light, especially darker on apical and marginal areas, with veins dark, with distinct microtrichia, without macrotrichia on membrane; alula fringed with several delicate hairs; vein R_1 closely applied along costa at its swollen distal area, costa slightly produced beyond end of R_{4+5}, crossvein r-m gradually curved. Abdomen entirely dark brown, with cerci slightly produced ventrad (Plate 5, fig. 94), spermathecæ dark brown, ovoid (fig. 95).

Allotype.—Alcoholic female; Kibune, Kyoto; March 25, 1936; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

The male specimen collected at the same locality has the antennal ratio 1.3.

SYNDIAMESA (SYNDIAMESA) BICOLOR sp. nov.

This fly was also collected at Kibune, Kyoto, in early spring.

Female.—Body 4 to 4.9 mm long, ground color yellowish brown, scutellum with three distinct dark vittæ, wings bicolored the proximal one-third yellowish and distal two-thirds brownish.

Head yellowish brown, with region of vertex dark brown, frontoclypeus brown, area between compound eyes yellow, mouth parts brown, eyes bare. Antennæ 7-segmented (25 : 30 : 18 : 23 : 20 : 25 : 68); proximal three segments including scape yellow, distal segments brown; ultimate segment with two apical setæ, without basal setæ; intermediate flagellar segments each with several verticils and four short trichoid sensillæ; antennal ratio about 0.6. Maxillary palpi 5-segmented (4 : 6 : 13 : 17 : 22), brown; third segment produced beyond insertion of fourth segment, black at tip. Pronotum yellow at dorsal part, yellowish brown at lateral parts, with three or four setæ at each side; scutum yellowish brown, highly pruinose and setigerous along

foveæ, with four vittæ, of which lateral are black and median brown on cephalic half and dark brown on caudal half; scutal setæ arise from small pale punctures of integument; scutellum brown; postscutellum black, not distinctly elongate caudad, round at caudal margin; pleural membranes yellow, pleural sclerites mainly yellowish brown; caudal half of notepisternum brown; sternepisternum and sternum brown or dark brown. Forelegs mainly dark brown, with trochanters and femoral bases brown; middle and hind legs with coxæ dark brown, trochanters and femora yellowish brown, knee joints black, tibiæ bicolored, being yellow on proximal three-fourths and black on distal one-fourth, tarsi entirely dark brown; fourth tarsal segments cylindrical; relative lengths of leg segments 92 : 107 : 83 : 40 : 28 : 13 : 11 in foreleg, 94 : 104 : 50 : 26 : 19 : 10 : 11 in middle leg, and 105 : 119 : 69 : 38 : 24 : 12 : 12 in hind leg; tarsal spurs on ventral sides and tips of proximal two segments of middle and hind legs; forelegs without tarsal spurs; claws simple; empodium small. Halteres yellow. Wings (Plate 6, fig. 83) bicolored, mainly brown, yellow basally under transmitted light, with distinct microtrichia but without macrotrichia on membrane; veins brown; costa slightly produced; r-m almost straight; alula fringed with delicate hairs. Abdominal terga all brown, sterna and cerci pale brown; cerci as in Plate 5, fig. 96; spermathecæ elongate, brown, each with a swollen hyaline neck region (fig. 97).

Habitat.—Honshu, Japan.

Holotype.—Female; Kibune, Kyoto; March 2, 1933.

Paratopotypes.—Females; March 2, 1933.

Type specimens.—Alcoholic; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This fly resembles *Syndiamesa* (*Syndiamesa*) *takatensis* Tokunaga, especially in the structure of maxillary palpi, but differs in coloration, especially in the bicolored wings.

SYNDIAMESA (LASIODIAMESA) CRASSIPILOSA sp. nov.

Female.—Body mainly black, 4.6 to 5.5 mm in length, wings with many macrotrichia on membrane.

Head with vertex dark brown, frontoclypeus, mouth parts and antennæ brown; eyes minutely pubescent, hairs being shorter than height of corneal lenses; antennæ 7-segmented (22 : 40 : 20 : 24 : 20 : 21 : 56); antennal ratio 0.45; second segment yellowish on basal half; ultimate segment with two apical and one

basal seta; maxillary palpi 5-segmented (3 : 7 : 12 : 17 : 21). Pronotum setigerous, dark brown; scutum black, with many erect setæ which arise from pale punctures, pruinose; scutellum and postscutellum black; pleuron with membranes yellow, sclerites black. Legs entirely dark brown; claws simple; empodium large; proportional lengths of segment of legs as follows: 95 : 114 : 78 : 41 : 26 : 13 : 11 in foreleg, 98 : 101 : 45 : 28 : 19 : 9.5 : 10.5 in middle leg, and 108 : 128 : 68 : 37 : 23 : 11 : 11 in hind leg; forelegs without tarsal spurs; middle and hind legs with tarsal spurs on proximal two segments. Halteres yellow. Wings (Plate 4, fig. 67) brown, faintly yellow at base; veins brown, setigerous; r-m almost straight, oblique; costa produced beyond end of R_{4+5}; membrane highly setigerous with short macrotrichia; cell R_5 bare on cephalic longitudinal half. Abdominal terga brown; sterna somewhat paler; cerci brown, highly produced ventrocephalad (Plate 5, fig. 92); spermathecæ dark brown, elongate, each with a pale brown basal part (fig. 93).

Habitat.—Honshu, Japan.

Holotype.—Female; Kibune, Kyoto; March 2, 1933.

Paratopotype.—Female; March 2, 1933.

Type specimens.—Alcoholic; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This fly is closely related to *Syndiamesa* (*Lasiodiamesa*) *pilosa* Kieffer, in which, however, the macrotrichia of the wings are found only on the distal areas of cells R_5 and M_1.

HEPTAGYIA NIPPONICA sp. nov.

This fly was collected at ligth in the autumn at Kibune, Kyoto.

Female.—General appearance somewhat like that of *Cricotopus;* body 3.5 mm in length, yellowish white in ground color; thorax with distinct vittæ.

Head with vertex dark brown; frontoclypeus and mouth parts pale brownish yellow; eyes bare, widely separated on dorsal side, distance between them greater than vertical length of eyes. Antennæ yellowish, 7-segmented (24 : 22 : 13 : 16 : 15 : 17 : 69); ultimate segment subequal in length to preceding four together, with pointed tip, a small apical seta, without basal setæ; second segment slightly constricted before middle; intermediate flagellar segments each with four verticils and three trichoid sensillæ; antennal ratio about 0.8. Maxillary palpi 5-segmented, longer than antennæ; ultimate segment longer than penultimate but

shorter than preceding two together. Pronotum yellowish white, with several yellow setæ at side; scutum shining, with three dark brown vittæ on yellow ground, with several yellow setæ along each fovea; scutellum brown, dark brown at margin, setigerous; postscutellum black; pleuron yellowish white in ground color; posterior half of notepisternum brown; epimeral sclerites pale brown; sternepisternum yellow, with ventral side brown, with a pair of brown stripes along lateral margin of ventral brown area. Legs with distinct tibial rings; foreleg with coxa and trochanter pale brown; femur dark brown, with basal one-fourth pale brown; tibia dark brown, with a narrow pale ring before middle; tarsus entirely dark brown; middle and hind legs similar in color to each other, with coxæ and trochanters yellowish white, tarsi dark brown; femora yellowish white, distal one-fourth dark brown; tibiæ dark brown, widely yellowish white at middle one-third; claws simple, with a strong and two small basal setæ; empodium small; pulvilli absent; fourth tarsal segment obcordate; tarsal spurs on proximal two segments of middle and hind legs, absent on forelegs; proportional lengths of leg segments as follows: 62 : 72 : 63 : 28 : 16 : 4 : 6.8 in foreleg, 65 : 67 : 35 : 19 : 10 : 4 : 6 in middle leg, and 71 : 81 : 49 : 24 : 11.5 : 4.5 : 7 in hind leg. Wings (Plate 5, fig. 82) about 2.8 mm in length, without both macro- and microtrichia on membrane; both squama and alula fringed; main veins yellow; R and R_1 setigerous with yellow setæ; R_{4+5} slightly setigerous at tip; costa distinctly produced beyond tip of R_{4+5}; R_{2+3} and M complete, not partially atrophied. Halteres white. Abdomen yellowish; tergum of second segment with a median pale brown cloud, terga from third to eighth each with a brown-clouded band; cerci white.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic female; Kibune, Kyoto; October 23, 1932; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

Females of two European species, *Heptagyia cinctipes* Edwards and *H. rugosa* Saunders, have the thorax dull black or black. In *H. lurida* Garrett, according to the description of Johannsen, the base of vein M is almost invisible, the ultimate segment of the maxillary palpus is as long as the preceding two segments taken together, and the last antennal segment is twice as long as the penultimate and has two apical setæ.

HEPTAGYIA EBURNEA sp. nov.

Female.—Body length only 2 mm, ivory white in ground color.

Head with vertex pale brown, mouth parts, frontoclypeus, and antennæ yellow or yellowish white. Antennæ 7-segmented (15 : 14 : 9 : 10 : 13 : 13 : 44), second and third segments incompletely segmented; ultimate segment elongate fusiform, with a small apical seta, without basal setæ, subequal in length to preceding four segments together. Pronotum yellow; scutum shining, pale yellowish white, with three brown vittæ, setigerous with several small decumbent setæ along each fovea; scutellum brownish yellow; postscutellum brown; pleural side yellow, with a brown cloud ventrad of wing base; sternal side pale brownish yellow. Foreleg mainly dark brown, with coxa, trochanter, and basal one-fifth of femur yellow; middle and hind legs similar in color to each other, with coxæ yellow, trochanters and femora yellowish white, knee joints very narrowly dark; tibiæ white, with distal end dark; first tarsal segment yellow, with end dark; remaining tarsal segments all dark brown; claws simple; pulvilli wanting; empodium very small; proximal two tarsal segments of middle and hind legs with paired apical spurs; forelegs without tarsal spurs; fourth tarsal segments of all legs distinctly cordiform; proportional lengths of segments of legs 36 : 40 : 35 : 16 : 10 : 3 : 4.5 in foreleg, 37 : 37 : 21 : 11 : 7 : 3 : 4.3 in middle leg, and 39 : 43 : 29 : 15 : 8 : 3 : 4.8 in hind leg. Halteres white. Wings (Plate 5, fig. 81) clearly hyaline, without both macro- and microtrichia; vein R and R_1 setigerous; R_{4+5} distally setigerous; M complete; R_{2+3} distally atrophied. Abdominal terga brownish yellow, paler on basal segments; sterna and cerci yellow.

Habitat.—Honshu, Japan.

Holotype.—Alcoholic female; Mount Ryozen, Siga Prefecture; June 3, 1930; deposited in the entomological laboratory, Kyoto Imperial University; collected by M. Tokunaga.

This species may be allied to *Heptagyia alboannulata* Strobl, but differs in having the first tarsal segments of the middle and hind legs yellow.

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(Mainly on the Japanese Tanypodinæ.)

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ILLUSTRATIONS

PLATE 1. ANATOPYNIA VARIA FABRICIUS

FIG. 1. Salivia and associated structures of larva, dorsal aspect.
2. Clypeolabrum of larva, cephalic aspect.
3. Antenna of larva.
4. Mandible of larva, with two tendons.
5. Hypopharyngeal sclerites of larva, with three tendons, dorsal aspect.
6. Labium of larva, ventral aspect.
7. Fifth abdominal tergum of larva.
8. Full-grown larva.
9. Claws of posterior pseudopod of larva.
10. Fifth abdominal segment of pupa; left half, dorsal side; right half, ventral side.
11. Seventh abdominal segment of pupa; left half, dorsal side; right half, ventral side.
12. First abdominal segment of pupa, dorsal aspect.
13. Prothoracic respiratory organs; left figure, dorsal aspect; right figure, lateral aspect.
14. Caudal swimming paddle of pupa, dorsal aspect.
15. Swimming paddle of pupa, pointed end.

PLATE 2

FIG. 16. *Clinotanypus decempunctatus* sp. nov., female wing.
17. *Clinotanypus japonicus* sp. nov., male wing; *au*, anastomosed vein of M_{3+4} and Cu_1; *fMCu*, fork between M_{3+4} and Cu_1; *fs*, first section of M_{3+4}.
18. *Clinotanypus sugiyamai* sp. nov., male wing.
19. *Tanypus punctipennis* Fabricius, male wing.
20. *Procladius sagittalis* Kieffer, female wing.
21. *Procladius nipponicus* sp. nov., male wing.
22. *Procladius crassinervis* Zetterstedt, female wing.
23. *Anatopynia nebulosa* Meigen, female wing.
24. *Clinotanypus japonicus* sp. nov., male hypopygium.
25. *Clinotanypus sugiyamai* sp. nov., male hypopygium.
26. *Tanypus punctipennis* Fabricius, female cercus.
27. *Tanypus punctipennis* Fabricius, female spermatheca.
28. *Tanypus punctipennis* Fabricius, male hypopygium.
29. *Procladius sagittalis* Kieffer, male hypopygium.
30. *Procladius sagittalis* Kieffer, female cercus.
31. *Procladius sagittalis* Kieffer, male spermatheca.
32. *Procladius nipponicus* sp. nov., male hypopygium.
33. *Procladius nipponicus* sp. nov., female cercus.

PLATE 3

FIG. 34. *Procladius nipponicus* sp. nov., female spermathecæ.
35. *Anatopynia kibunensis* sp. nov., female wing.
36. *Anatopynia japonica* sp. nov., female wing.
37. *Anatopynia goetghebueri* Kieffer, male wing.
38. *Anatopynia varia* Fabricius, male wing.
39. *Anatopynia yoshimurai* sp. nov., female wing.
40. *Pentaneura minuta* sp. nov., male wing.
41. *Pentaneura maculipennis* Zetterstedt, male wing.
42. *Pentaneura octopunctata* sp. nov., male wing.
43. *Pentaneura multifascia* sp. nov., male wing.
44. *Procladius crassinervis* Zetterstedt, female cercus.
45. *Procladius crassinervis* Zetterstedt, female spermatheca.
46. *Anatopynia nebulosa* Meigen, female spermatheca.
47. *Anatopynia nebulosa* Meigen, female cercus.
48. *Anatopynia goetghebueri* Kieffer, male hypopygium.
49. *Anatopynia goetghebueri* Kieffer, female spermatheca.
50. *Anatopynia goetghebueri* Kieffer, female cercus.
51. *Anatopynia varia* Fabricius, female cercus.
52. *Anatopynia varia* Fabricius, female spermatheca.
53. *Anatopynia japonica* sp. nov., male hypopygium.
54. *Anatopynia yoshimurai* sp. nov., female cercus.
55. *Anatopynia yoshimurai* sp. nov., female spermatheca.
56. *Anatopynia varia* Fabricius, male hypopygium.
57. *Pentaneura maculipennis* Zetterstedt, female spermatheca.
58. *Pentaneura maculipennis* Zetterstedt, female cercus.

PLATE 4

FIG. 59. *Pentaneura divisa* Walker, male wing.
60. *Pentaneura longipennis* sp. nov., male wing.
61. *Pentaneura kyotoensis* sp. nov., male wing.
62. *Pentaneura melanops* Meigen, male wing.
63. *Pentaneura japonica* sp. nov., female wing; *fs*, first section of M_{3+4}.
64. *Pentaneura alba* sp. nov., female wing.
65. *Pentaneura monticola* sp. nov., male wing.
66. *Pentaneura monilis* Linnæus, male wing.
67. *Syndiamesa* (*Lasiodiamesa*) *crassipilosa* sp. nov., female wing.
68. *Pentaneura melanops* Meigen, female spermatheca.
69. *Pentaneura melanops* Meigen, female cercus.
70. *Pentaneura longipennis* sp. nov., female cercus.
71. *Pentaneura longipennis* sp. nov., female spermatheca.
72. *Pentaneura japonica* sp. nov., female cercus.
73. *Pentaneura japonica* sp. nov., female spermatheca.
74. *Pentaneura alba* sp. nov., male hypopygium.
75. *Pentaneura alba* sp. nov., female spermatheca.
76. *Pentaneura alba* sp. nov., female cercus.
77. *Pentaneura monticola* sp. nov., male hypopygium.
78. *Pentaneura monilis* Linnæus, female cercus.
79. *Pentaneura monilis* Linnæus, female spermatheca.
80. *Pentaneura monilis* Linnæus, male hypopygium.

PLATE 5

FIG. 81. *Heptagyia eburnea* sp. nov., female wing.
82. *Heptagyia nipponica* sp. nov., female wing.
83. *Syndiamesa* (*Syndiamesa*) *bicolor* sp. nov., female wing.
84. *Diamesa* (*Diamesa*) *plumicornis* Tokunaga, female wing.
85. *Pentaneura longipennis* sp. nov., male hypopygium.
86. *Pentaneura divisa* Walker, male hypopygium.
87. *Pentaneura kyotoensis* sp. nov., male hypopygium.
88. *Pentaneura maculipennis* Zetterstedt, male hypopygium.
89. *Pentaneura melanops* Meigen, male hypopygium.
90. *Pentaneura multifascia* sp. nov., male hypopygium.
91. *Pentaneura octopunctata* sp. nov., male hypopygium.
92. *Syndiamesa* (*Lasiodiamesa*) *crassipilosa* sp. nov., female cercus.
93. *Syndiamesa* (*Lasiodiamesa*) *crassipilosa* sp. nov., female spermathecæ.
94. *Diamesa* (*Diamesa*) *plumicornis* Tokunaga, female cercus.
95. *Diamesa* (*Diamesa*) *plumicornis* Tokunaga, female spermatheca.
96. *Syndiamesa* (*Syndiamesa*) *bicolor* sp. nov., female cercus.
97. *Syndiamesa* (*Syndiamesa*) *bicolor* sp. nov., female spermathecæ.

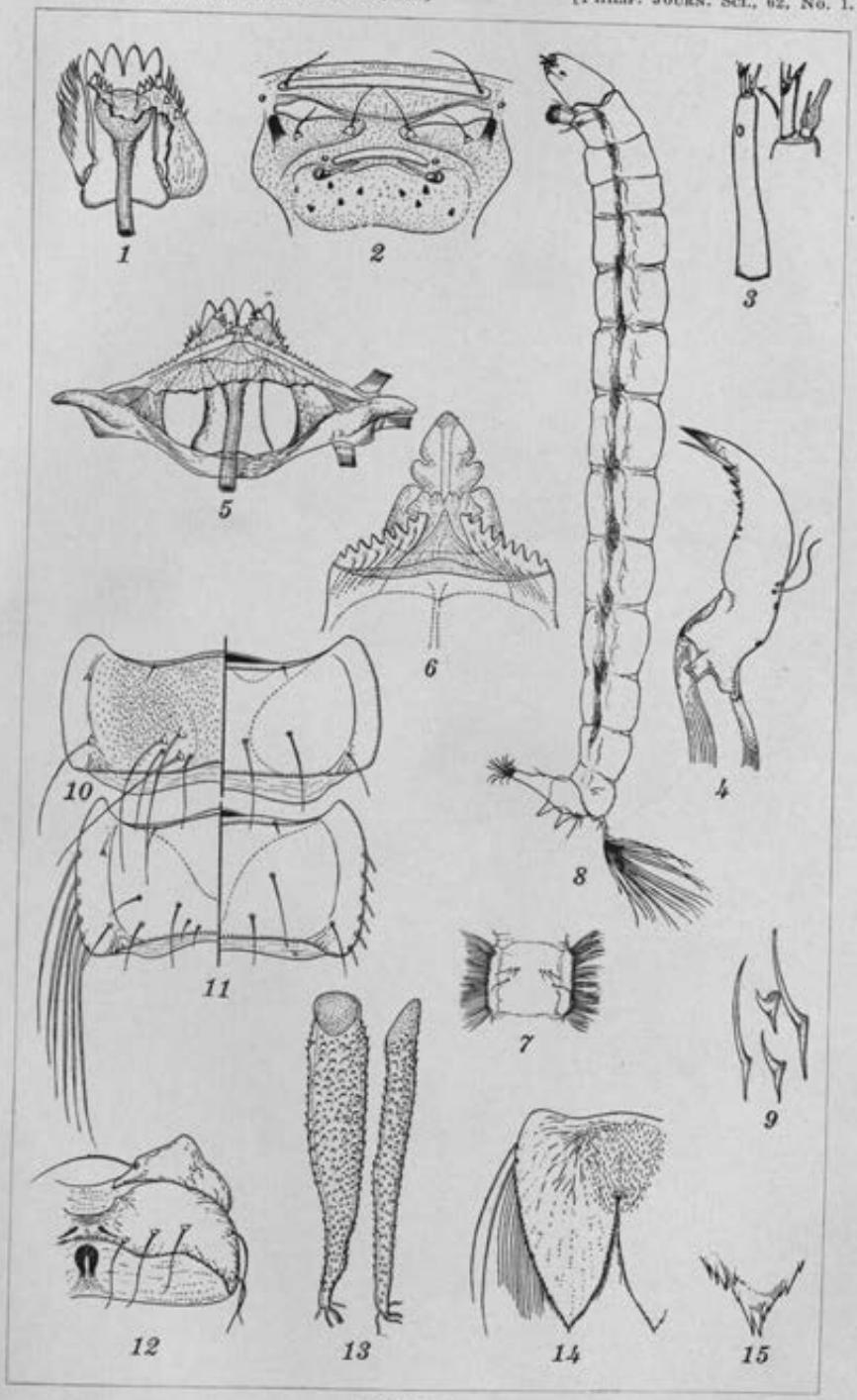

PLATE 1.

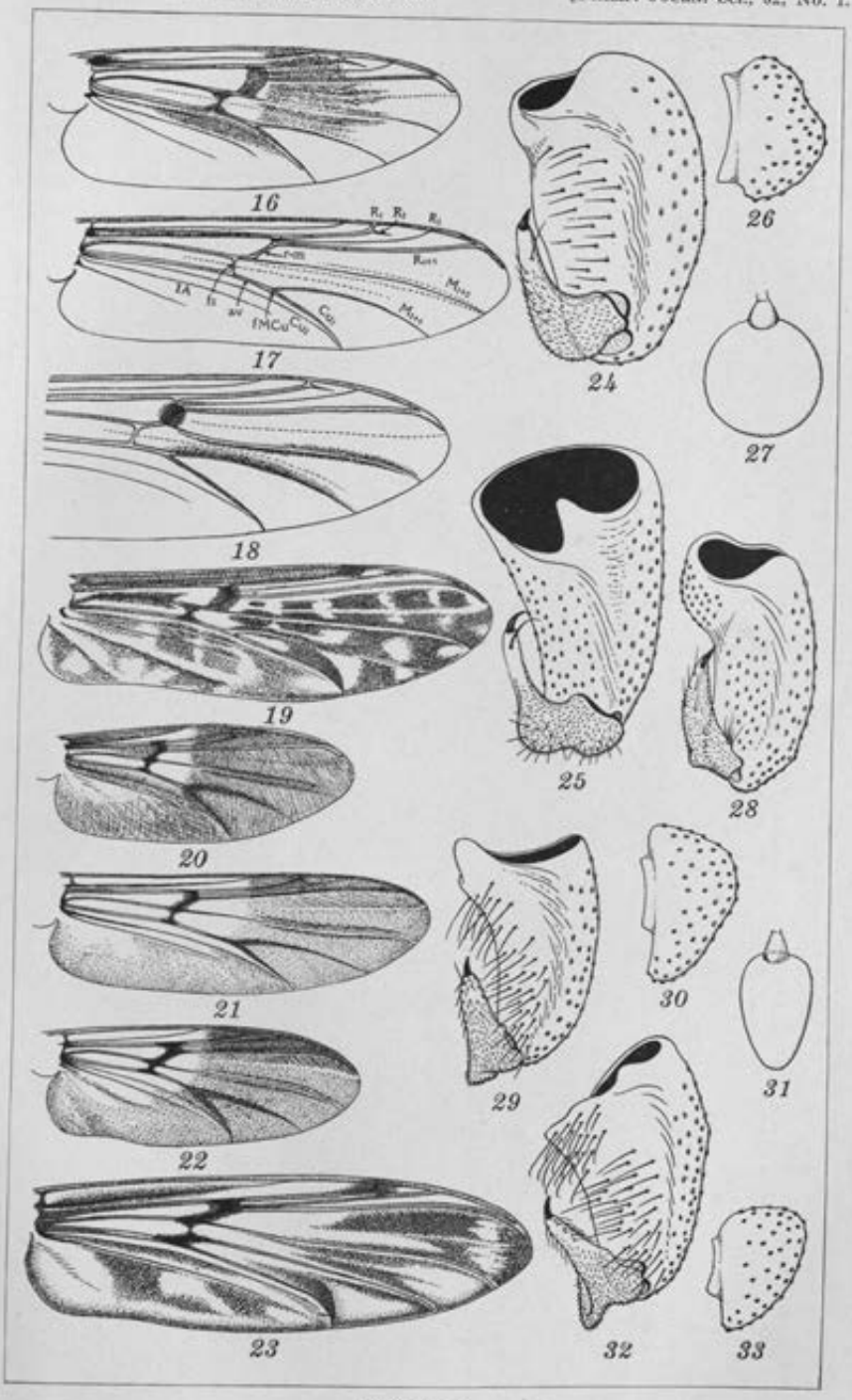

PLATE 2.

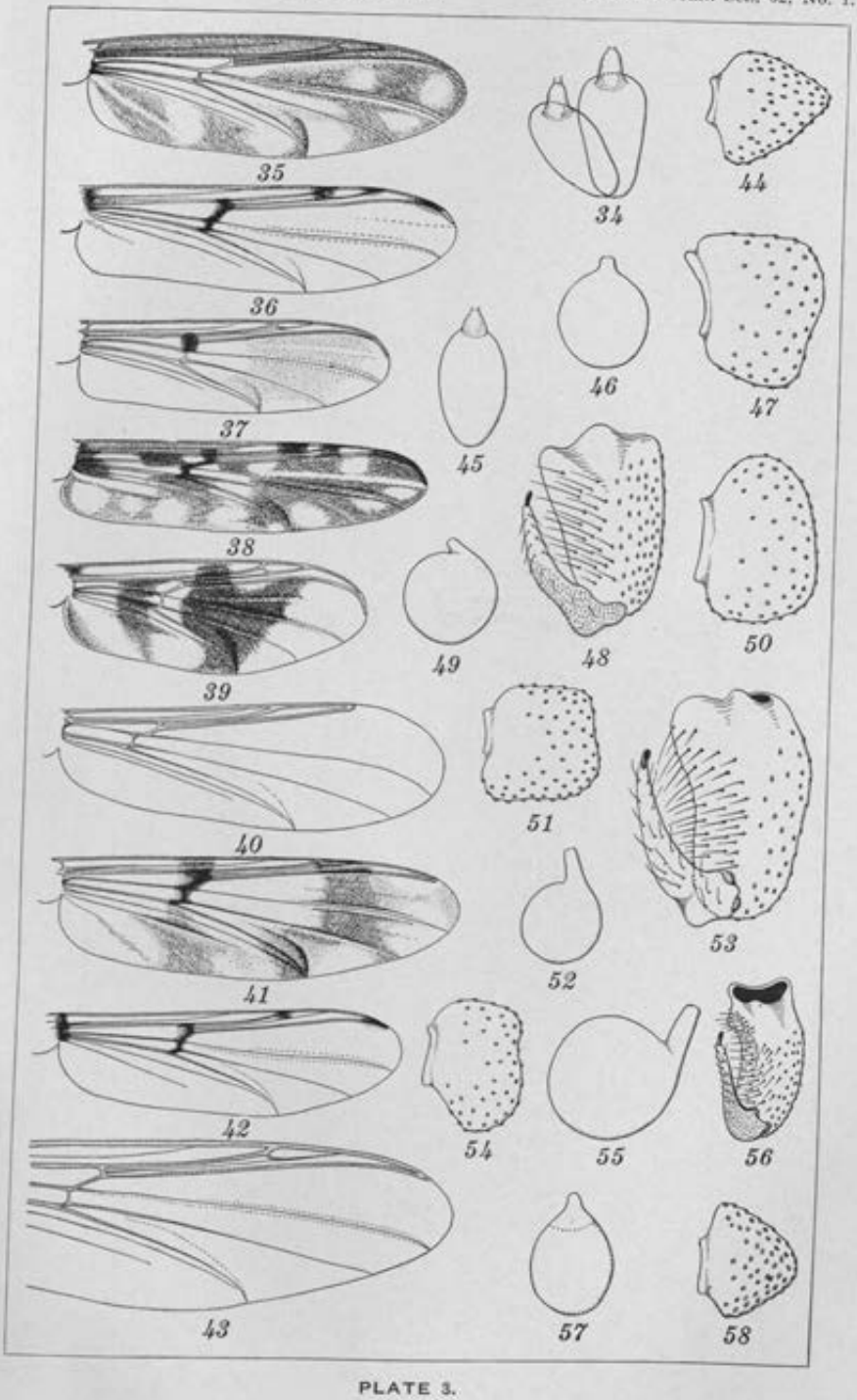
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PLATE 3.

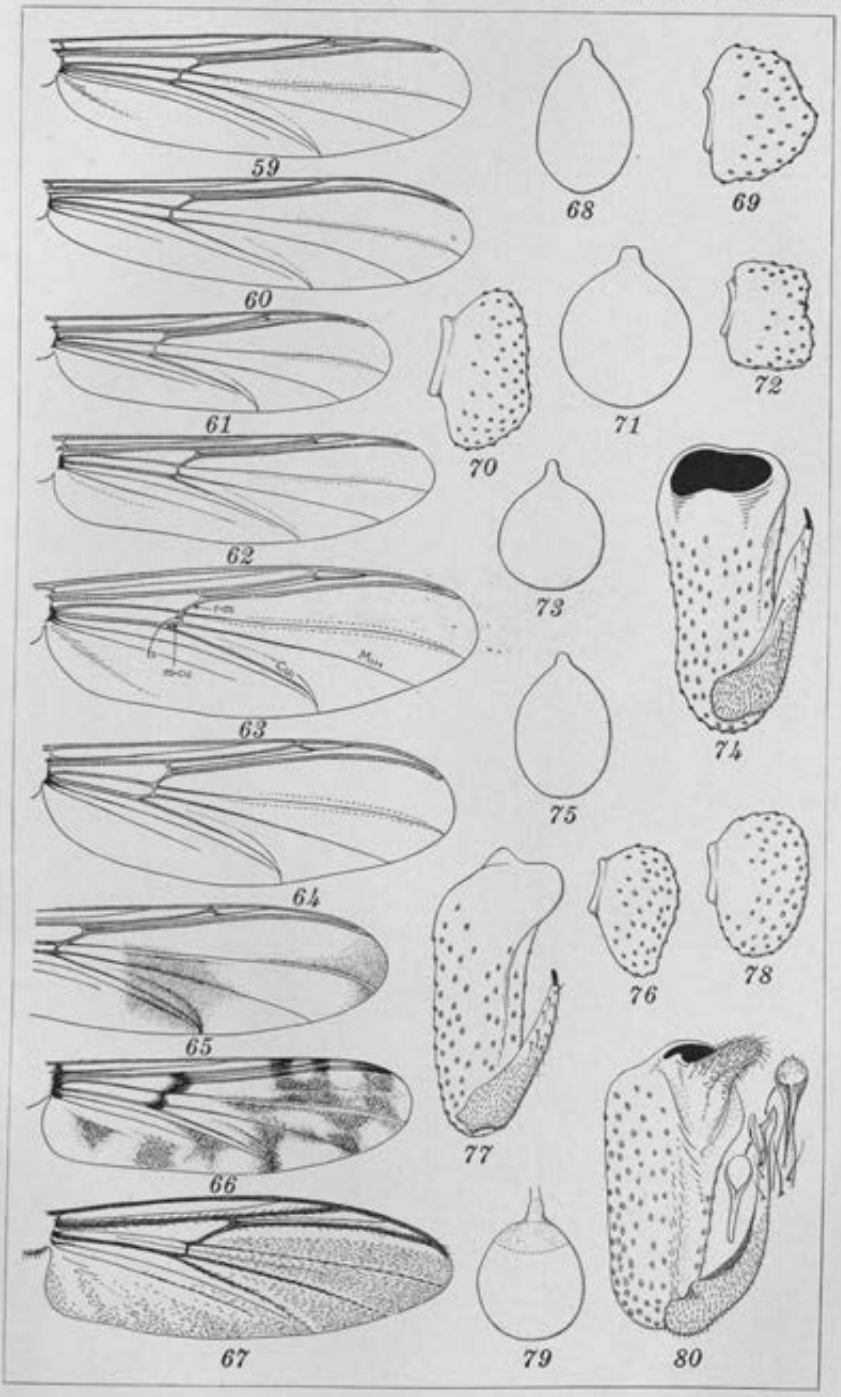

PLATE 4.

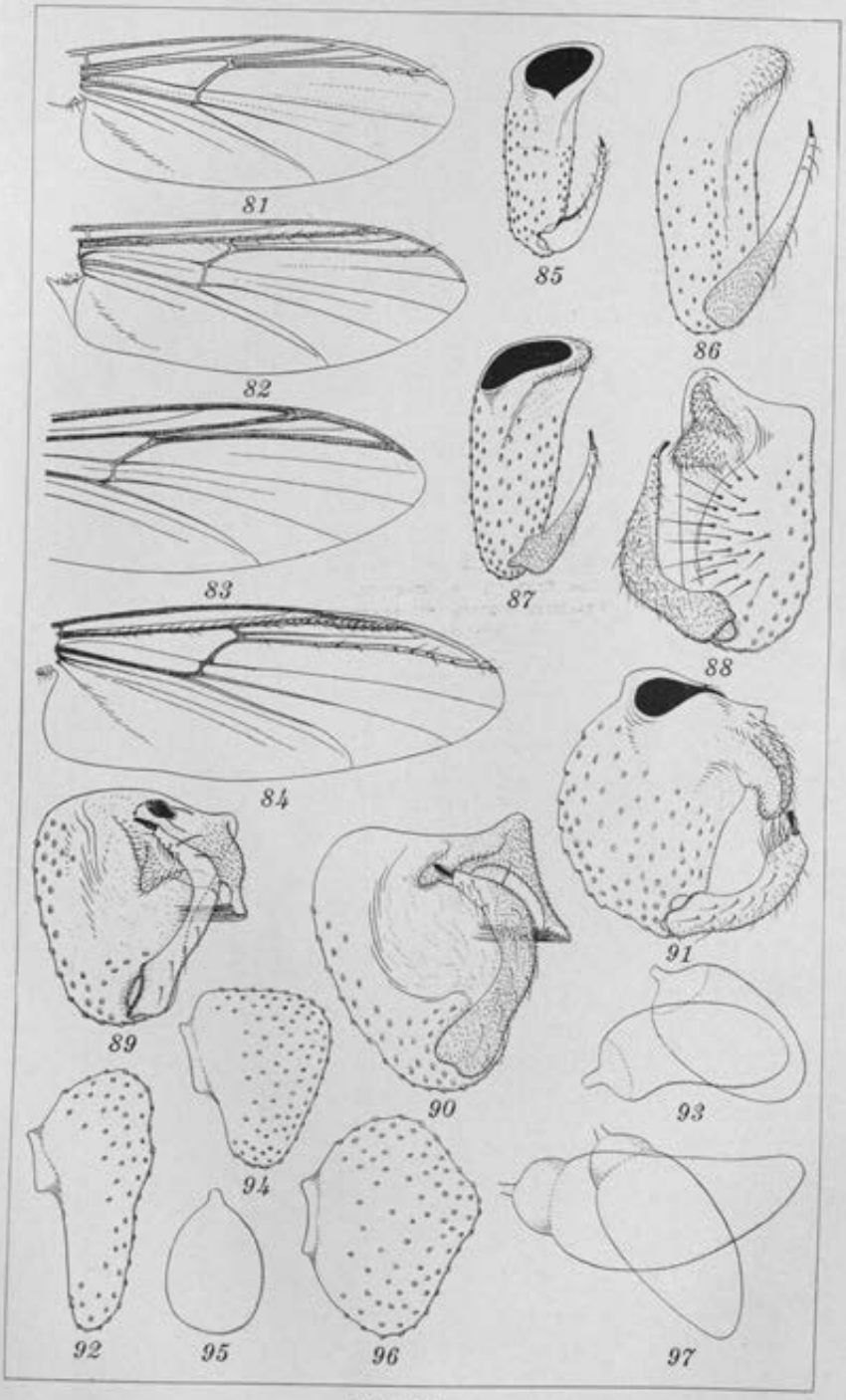

PLATE 5.

ILOKO CONSTRUCTIONS

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EIGHT PLATES

In the present paper we shall try to describe as accurately as possible the different parts of—

The Iloko house.—Under this heading will be included a few parts of granaries and other buildings, which have special names.

The Iloko cart.—Under this heading will be included a few other vehicles or means of conveyance possessed by the Iloko. Water craft has been discussed in a previous paper.[1]

In both lists we shall arrange the names alphabetically, so that they will be of greater use to the missionary or explorer who has to learn the Iloko language. At the same time we shall give under each name the necessary references, so as to make matters clear to all readers.

We shall include only native Iloko names, of course, and, although we shall give only those that came to our personal notice, we are convinced that the subject will be treated rather thoroughly, and that our paper will cover practically the whole field we intended to explore. Iloko furniture and implements may be treated later.

THE ILOKO HOUSE

abúlog. The fence, generally made of light bamboo (*bólo*, *Schizostachyum macrostachyum*), which incloses the space under the house (*sirok*), between the ground and the floor. This fence is only to be found in well-kept houses; in most cases the *álad* or fence around the yard or garden is the only inclosing barrier.

abút. Hole, pit, etc.; for example, the hole dug in the ground for the reception of a post (*adígi* or *sinŋ̃it*); a hole in the roof, in the floor, in the walls, etc.

adígi. Any of the principal posts on which the whole frame or skeleton of the house is built. They are generally planted in the ground, sometimes, but rarely, set on supplementary stones, or blocks of wood, masonry, or cement. They always reach the tiebeams (*awanán* and *sekkég*), which fit in mortises (*paraŋ̃gáw*) prepared at the upper part of the *adígi*. The part of the *adígi* from the ground up to the floor is visible from outside, provided that no *abúlog* or fence has been con-

[1] Anthropos 22: 240–242.

structed, while the part of the *adigi* from the floor up to the tie-beams is visible only from inside. The *adigi* that are situated at the corners (usually four) are called *dógo;* the others, *bayábay.* Cf. *singgit.* (See Plate 2, fig. 7, *a;* Plate 3, figs. 9, *a, b;* 10, *c;* 11, *a;* Plate 5, fig. 22, *a, b;* Plate 7, figs. 30–32.)

agámang. Granary. The *agámang,* called *sarísar* in some districts, is generally more or less of the same type of construction as the ordinary house. Its shape is usually that of an upturned, truncated, rectangular or square pyramid resting on four posts (*singgit*), and covered with a roof of the *tinúbong* type or gable roof. (See Plate 3, fig. 12.)

agdán. Ladder; stairs or staircase. All Iloko houses have either a ladder, which is generally made of heavy bamboo (*kawáyan, Bambusa blumeana,* etc.), sometimes of timber, or, rarely, a staircase made of timber, masonry, or concrete. In ordinary bamboo ladders the side pieces (*baúteh*) are complete, round sections of bamboo, and the rungs or steps (*tekád*) are parts of a section of bamboo cut lengthwise. Besides the rung that fits in the side pieces, the Iloko sometimes add a second crosspiece, which they tie or nail to the side pieces in front of each simple rung. In a few cases, instead of bamboo, timber is used either for the single rungs or for the double ones, or for one part of the double ones. (See Plate 5, fig. 21.)

agsit. Layer of nipa leaves (*Nipa fruticans*) or of cogon grass (*Imperata cylindrica*), used for thatching. An ordinary layer is usually from four to five feet long. The nipa leaves are strung on and tied to a lath of bamboo, while the cogon grass is pressed between two laths of bamboo, both at its lower part (*sigpit*) and about the middle (*puŋŋán*). The tops of either the nipa leaves or the cogon grass hang loose. These layers are tied to the rafters in rows (*kásaw*) running horizontally all along the roof; they are superposed in such a way as to leave about five inches between the upper part of each layer and the next one. It goes without saying that the tops of the leaves or of the grass hang downward and that the first and undermost layers or rows of layers are situated at the eaves, the succeeding ones ascending gradually towards the ridge of the roof. Cf. *pinaúd* and *puyúk.* (See Plate 6, fig. 27.)

akilis. Strips of rattan used to tie together laths of bamboo, so as to form extensive layers, mostly used in flooring. The laths of bamboo are placed in juxtaposition, and in several places, at distances of from one to two feet, they are tied together by a strip of rattan running in a straight line. The whole outfit, the laths of bamboo and the rattan strips that keep them together, is called *inakílis.* (See Plate 6, fig. 26, *f.*)

alintúbong. Any of the small pieces of heavy bamboo attached to the walls of the house, at the outside, at about the height of the upper part of doors and windows. There are at least two such pieces to each wall, one at each corner, and a supplementary *alintúbong* is placed between each door or window and the next one. These pieces serve as supports for the *alatoátan,* which passes through the hole situated at or near the center of each *alintúbong.* In some houses,

however, the *alotoótan* are simply tied to the wall or to some part of the eaves, in which case no *alintáboñg* is necessary. (See Plate 1, fig. 2, *g*.)

alotoótan. Any of the bamboos that run horizontally along the wall of the house, at the outside, a little higher than the upper part of doors and windows. They serve as supports for the common shutters (made of light materials: bamboo, nipa, etc.) of doors and windows, whose upper part slides over the *alotoótan*, whenever a door or window has to be opened or closed. (See Plate 1, fig. 2, *f*.)

appút. The pieces of timber that run all along the eaves, underneath, covering the extremities of the projecting ceiling joists. These joists, which extend beyond the walls of the house and reach the eaves, end in tenons, and, consequently, mortises are made in the *appút* in front of each joist. As these projections of the ceiling joists are absent in the majority of Iloko houses, the *appút* are of rather rare occurrence.

atép. Roof. This term includes only the roofing, that is: cogon, nipa, corrugated iron, etc., not the rafters, etc. Cf. *álo*.

awanán. Either of the two tie-beams that run from one *dágo* or corner post to the other, under the lower part of the *bayakán* (trapezoid or rectangular side of the roof). When the floor plan of the building is a square, the two *awanán* and the two *sekkég* are identical; but when the floor plan is a rectangle, which is the case in the great majority of Iloko buildings, the *awanán* are much longer than the *sekkég*. Cf. *sekkég*. (See Plate 1, fig. 1, *a*; Plate 3, figs. 9, *f*; 10, *n*; 11, *c*; 12, *c*; Plate 6, fig. 28, *c*.)

b(in)akúl. Twilled; the ordinary way of weaving light bamboo into large sheets, whether close-woven (*tidtid*) or open-worked (*minatá*): each bamboo or strip of bamboo runs alternately over and under two (not one) transverse bamboos. It is chiefly used for walling (*tidtid*), flooring (*tidtid*), and roofing (*minatá*) purposes. Cf. *sinaré*. (See Plate 1, fig. 2, *e*; Plate 5, fig. 23; Plate 6, *fig.* 26, *g*.)

balathát. The bamboos that run horizontally all along the roof, across all the rafters, at the inside, about halfway between the walls and the ridge of the roof. They correspond more or less to our purlins. The real *balathát* occur only in houses of the *pinagdáñg* type; the corresponding bamboos, which are generally three instead of one, in houses of the *tinúbeñg* type, are called *lalabayan*.

The same name is applied to the flattened bamboo that runs all along the edge of a section of woven bamboo (*tidtid*), in order to cover this edge and give the whole section a neater appearance. (See Plate 1, fig. 2, *e*.)

baláy. House, dwelling, residence, habitation, abode. A perfect Iloko house consists of three main parts: the house proper or *kadaklán* with its own separate roof, the kitchen or *kosina* (Spanish: *cocina*), and the *batalán* which connects the two. In almost all Iloko houses the kitchen is separated from the main building and has its own roof; but the shape, size, and situation of the *batalán*, if it exists at all, is exceedingly variable, as will be seen in due time. (Plate 2, fig. 8.)

The term *balây* is sometimes applied to the sitting room or *teñgñgá*.

ballóloñg. Head of a frame. In houses whose window sashes and doors are made of timber, the *ballóloñg* is the highest piece in a door frame or window frame, and it runs through from one end of the wall to the other. In houses that have shutters made of bamboo, the *ballóloñg* is the part of the wall, above a door or window, to which the head *talañgkób* is applied. Cf. *talañgkób*. (See Plate 1, fig. 3, *a*.)

balunét. A bar of timber or heavy bamboo used to fasten ordinary doors and window shutters (made of light materials) from inside. Doors and window shutters hang loose from the *alatedtun* and, consequently, are easily lifted up outward from beneath. To prevent this, a ring of rattan is fixed about their center, at the inside, in order to hold the *balunét*, which passes through that ring and, being longer than the width of the door or window, presses with both extremities against the uprights of the frame at the inside. See Plate 1, fig. 3, *c*.

(pagba)bañgú(an). Any place on the *bañgsál* where rice is washed and *báñga* are cleansed. *Báñga* are round, earthen pots with a round bottom, in which rice is cooked. The combination *pag . . . an* is a locative. The reduplication indicates habit, custom, easiness or readiness in performing an action, etc.

bañgén. A small, low, fencelike device, made of bamboo and placed upright over the doorsill or threshold. It is high enough to prevent small children from getting out and tumbling down the ladder, and low enough to allow older children and adults easily to step over it.

The same name is applied to the ensemble of horizontal bars of timber or bamboo that close the gates used in fences. (See Plate 2, fig. 4, *a*.)

bañgkil. The hook that keeps sliding doors and windows shut from inside, and the bar of timber or bamboo that keeps folding doors and windows shut from inside. (See Plate 2, fig. 5, *a*.)

The same name is applied to a piece of iron, wood, etc., used to twist and tighten a rope that has to serve as a clamp. (See Plate 2, fig. 6, *a*.)

bañgsál. An annex to the kitchen consisting of a kind of platform raised on posts (*siñgit*) and not covered by any kind of roof. This platform generally consists of a certain number of unsplit bamboos with more or less large interstices between them, and it is usually lower than the floor of the kitchen, never higher. On the *bañgsál* are placed the large earthen jars which contain the water to be used for cleansing and bathing purposes. There pots and pans, rice, vegetables, etc., are cleansed; palay, meat, fish, etc., are dried in the sun; people bathe, urinate, etc. (See Plate 2, fig. 8, *d*.)

barikes. Horizontal beams that run all around the house, either inside or outside or both, about halfway between the tiebeams and the floor, at the height of the window sills, and to which the walling of the house is nailed or tied. The *barikes* is absent in some houses, and in others it is replaced by the *paladpád*. (See Plate 2, figs. 7, *c*; Plate 3, fig. 9, *g*.)

básar. A kind of floor or flooring made of rather large strips of

heavy bamboo, which are tied together as described under *akílis*, rarely nailed to the joists. The interstices between the laths of bamboo are much larger in the *básar* than in the *datár*, and sometimes a second flooring or *dapílat*, made of woven bamboo or *tidtíd*, covers the *básar*. The *básar* is also used to make benches, beds, etc. (See Plate 6, fig. 26, *e*.)

batalán. One of the three principal parts of a perfect Iloko house, very often in the form of a penthouse. Its size and shape are exceedingly variable, and it very often directly connects the kitchen with the *kadaklán* or main building. Sometimes the *batalán* is entirely absent, but, wherever it exists, it is situated somewhere between the kitchen and the *kadaklán*. In some houses the *batalán* has its own roof, different from both the roof of the kitchen and that of the *kadaklán;* in others, at least a part of the roof of the *batalán* is a direct continuation of one or two of the slopes of the roof either of the kitchen or of the *kadaklán* or of both. The main door of the house, where the ladder is placed, usually opens on the *batalán*, so that one has to pass through a part of the latter when entering the house and going either to the kitchen or to the main building. The *batalán* very often serves as a dining room, and sometimes as a waiting room for peddlers, beggars, etc. (See Plate 2, fig. 8, *b*.)

batáŋŋan. Any of the four horizontal beams of the granary, that connect the four posts (*síŋŋit*) at the height of the floor. The *batáŋŋan* correspond to the combined *lipít* and *patapáya* of the house, but they end in tenons, fitting in mortises cut in the *síŋŋit* or posts, which is not the case with the *lipít* and *patapáya*. (See Plate 3, fig. 12, *d*.)

batáŋŋá. Any horizontal piece of timber or bamboo which serves as a temporary support for something else. For example: a piece of timber or bamboo tied to the wall of a house, and on which stands or sits a person who has to do some work at a place he cannot reach otherwise; a piece of timber or bamboo attached to a post, a tree, etc., and on which is laid a beam, a tree, etc., that has to be sawed, etc.

baútek. Side piece of a ladder; side piece of a door or window shutter, whose frame is made of bamboo. *Baútek* also means "I whip;" from the stem *báut* (whipping), the suffix *en* (reduced to *e* when followed by the possessive of the first or second person singular) of substantival verbs, and the possessive of the first person singular *ko* (reduced to *k* when following a vowel). Cf. *aydán*. (See Plate 1, fig. 2, *d;* Plate 5, fig. 21, *a*.)

bayábay. Any of the principal posts or *adigí* of the house, except the *dágo* or corner posts. Cf. *adigí* and *dágo*. (See Plate 3, fig. 9, *b;* Plate 5, fig. 22, *b;* Plate 7, figs. 30, 31.)

bayakán. Either of the two trapezoid (in houses of the *pinag-ŋŋ* type) or rectangular (in houses of the *tinúbeŋŋ* type) sloping sides of the roof. A *bayakán* extends from one of the *aseánan* tiebeams to the ridge of the roof. Cf. *álo* and *sóba*. (See Plate 3, fig. 9, *k;* 10, *k;* 11, *b*.)

(bayaŋŋ)báyaŋŋ. The gable or vertical, triangular portion of the wall (in houses of the *tinúbeŋŋ* type), that extends from the *sekkég* tiebeam to the ridge of the roof. The base of the *bayaŋŋbá-*

pañg is the *sekkég*; the two other sides are the *nolókan* rafters, and its apex is at the ridge of the roof. (See Plate 3, fig. 9, *l*.)

bekkér. The *bekkér* or *sikañg* is a tiebeam, parallel with the two *sekkég*. Like the latter it connects both *awanán*; but, instead of running between two *dúgo* or corner posts, like the *sekkég*, the *bekkér* runs between two *bayábag*. (See Plate 1, fig. 1, *c*.)

bennég. The horizontal beam which is placed over the floor and on which is raised the partition between the sitting room (*teñgañgá*) and the sleeping rooms (*silíd*). It generally runs parallel with and immediately under a *bekkér* tiebeam.

biriñg. The strip or strips of rattan used to bind together a principal post or *adígi* and some important horizontal beam, for example: an *awanán*, a *sekkég*, a *patapáya*, etc.

(pam)iriñg(án). A hole in an *adígi* or principal post, an *awanán*, a *sekkég*, a *patapáya*, etc., through which passes a *biriñg*. The combination *pañg . . . an* is a locative; the final *ñg* of the prefix is combined with the initial *b* of the stem into *m*.

bobóñg. Ridging: thatch, nipa leaves, etc., that cover the ridge of the roof.

boboñg(án). The two beams at the ridge of the roof, namely: the *sallabáwan*, on which the rafters rest, and the *pakabáyo* (from the instrumental prefix *pa* and the Spanish *caballo*, horse), which rests upon the rafters. The latter runs parallel with the *sallabáwan* and is covered with the *bobóñg* or ridging. *Boboñgán* (locative suffix *an*) literally means "that on which the *bobóñg* rests." Cf. *tul-óng*. (See Plate 4, fig. 13.)

busór(an). A girder supporting the floor joists; it is either a piece of timber or a heavy bamboo. *Búsor* literally means "enemy;" the suffix is a locative. (See Plate 6, fig. 26, *b*.)

(ka)dakl(án). The principal part of the house, the house proper. The *kadaklán* has its own roof, and is either of the *tinúbañg* type with a gable roof, or of the *pinagúñg* type with a hip roof. Its floor plan is generally a rectangle, rarely a square. *Dakkél* means "large, great;" *kadakkelán* or *kadaklán* means "the largest." Cf. *laém*. (See Plate 2, fig. 8, *a*.)

(pagda)dalikan(án). The place around the hearth. As the Iloko have no word for kitchen (which they call *kosina*, Spanish *cocina*), it is very probable that formerly the hearth was situated somewhere in a corner of the *laém*, as is still the case in a few Iloko houses and in most all houses of the so-called non-Christian tribes. *Dalikán* means "hearth;" the combination *pag . . . an* is a locative; the reduplication indicates habit, custom, easiness, or readiness in performing an action, etc.

dapián. A loose board or other piece of timber placed on the floor at the entrance of the house, near the ladder, and also at the entrance of any part of the house whose floor is lower than the rest. The *dapián* more or less corresponds to our doorsill or threshold, as it is situated over the first part of the floor one treads upon, when entering either the house, by the ladder, or any part of the house, whose floor is lower than that of the place one comes from.

daplát. A layer or sheet of woven bamboo, used for flooring (*tidtíd*) and roofing (*minatá*) purposes. It is generally laid immediately

over the *básar* (*tidtid*) or under the roofing (*minatá*). (See Plate 6, fig. 26, *g*.)

datár. A kind of floor or flooring made of rather small and thin strips of heavy bamboo tied together as described under *aktilis*. The interstices between the laths of bamboo are almost negligible, which is not the case with the *básar*. The *datár* is much nicer than the *básar*, even though the latter be covered with a *daplát*, and the floor of the sleeping room or that part of the *laém*, where the inmates sleep, is ordinarily made of *datár*, although all the rest be *básar*.

Nowadays, the term *datár* very often stands for floor in general. Sometimes, however, especially when the floor is made of boards, the Spanish term *suelo*, floor, is used.

dellég. The ensemble of floor joists of heavy bamboo. Floor joists of timber are generally called *soléras* (Spanish). (See Plate 6, fig. 26, *c*.)

(ka)dsaár(an). The floor as a whole. It consists of the *buobóan*, the *delleg* or *soléras*, the *paŋŋarísan*, and the *básar* (with or without *daplát*) or *datár*. From the stem *dessáar*, "placing on the floor," and the locative *ka . . . an*. (See Plate 6, fig. 26.)

didíŋŋ. Wall (of a house, a room, etc.). The exterior walls are generally made of light bamboo, either *talép* or *tidtid*; sometimes of nipa, boards, etc. Partitions are usually made of *tidtid*, sometimes of boards.

dógo. Any of the corner posts. They are usually four. Cf. *adigi* and *bagábag*. (See Plate 2, fig. 7, *a*; Plate 3, figs. 9, *a*; 10, *c*; 11, *a*; Plate 5, fig. 22, *a*; Plate 7, fig. 32.)

duág. Appentice or penthouse. A lean-to roof attached to and sloping from a wall, as one sheltering a staircase, a balcony, a lean-to, etc. Cf. *(pa)tagnáb*.

gálut. Anything (mostly strips of rattan or of bamboo) that is used for binding or tying purposes, at any part of the house, the granary, the fence, etc. Cf. *biriŋŋ* and *rákab*.

kádaŋŋ. The eight pieces of timber that run crosswise from the top of one *paroustógan* to the base of the next one. The *kádaŋŋ* form four irregular Saint Andrew's crosses, one at each side of the granary. (See Plate 3, fig. 12, *b*.)

kalapáw. Hut, hovel, shed. Any small, roofed shelter, with or without walls, made of light materials, as bamboo, reed, cogon, nipa, etc., and used as a temporary shelter for passing the night; in the daytime, as a shelter from where birds are frightened away from the ripening harvest; as a dwelling while guarding the growing crop, etc. Sometimes, however, the whole family goes to live in the field, at the time of the ripening and harvesting of the crop; in which case the *kalapáw* is more or less a replica of an ordinary simple Iloko house. It should be noted that a polite Iloko will always call his house, be it a hovel or a palace, his *kalapáw*.

kamáŋŋ(an). Joint. Any place or part where two pieces of timber, bamboo, etc., are united. For example: the place where a rafter rests on a tiebeam. *Kámaŋŋ* means "refuge;" the suffix is a locative. Cf. *(pag)saŋŋál(an)*. (See Plate 4, fig. 18.)

(ka)kapt(án). Rail. A bar of timber or bamboo, situated at one or at both sides of the ladder, and

taken hold of by people mounting the latter. Its upper end is generally attached to one of the uprights of the door frame, about halfway; and its lower end to a short, slender post of timber or bamboo (the newel), which is attached to one of the side pieces of the ladder, or planted in the ground at its foot. In more elaborate staircases, the *kakaptán* is a real balustrade. *Kapét* means "sticking to, taking hold of;" the combination *ka . . . an* is a locative.

(pagka)karambá(an). The place where the *karámba* are located, resting on their supports. It is generally situated in the kitchen, sometimes on the *baŋŋśál*, rarely elsewhere. The *karámba* are rather large, round earthen jars with a round bottom, in which water is kept for drinking purposes. The combination *pag . . . an* is a locative. The reduplication indicates habit, custom, easiness or readiness in performing an action, etc.

kásaw. A row of layers of nipa leaves or cogon grass, used for thatching. Cf. *agsít*.

káwad. Wooden pegs, stuck in the posts, to prevent them from moving to and fro. Wherever *káwad* are used, several of them are driven in each post all around, in the section that is planted in the ground, not far from the surface, above which the *káwad* never protrude. *Káwad* also means "groping, etc."

(pa)kikit. Jack rafter: a short rafter that extends from a *salókan* to a tiebeam (*awanán* or *sekkéŋ*), in hip roofs (*pinag-úŋŋ*). *Kikít* means "little finger;" the prefix is an instrumental. (See Plate 3, fig. 10, *h*.)

(kinsi)kinsi. Any ornamentation of the exterior walls (made of boards) of the house, which consists in a combination of comparatively small pieces of timber worked into various designs. The *kinsikinsi* is visible only from outside, and covers only the lower part of the house up to the windows. It very often takes the place of the wall under each window, where wooden shutters opening inside cover the *kinsikinsi*. It is also found in balustrades or *barandílias* (Spanish: *barandillas*), where it takes the place of balusters, along the edge of a balcony, terrace, staircase, etc. The term *kinsikinsi* is probably not genuine Iloko. In Spanish *quince* means: fifteen. The reduplication occurring in *kinsikinsi* indicates either resemblance or repetition of an action. (See Plate 4, figs. 14–17.)

(pa)kokó. The notched lower part of a rafter, that rests upon a tiebeam (*awanán* or *sekkéŋ*). *Kokó* means "nail, claw;" the prefix is an instrumental. (See Plate 4, fig. 18, *c*.)

koribatóŋŋ. The vertical laths of timber or bamboo which are found all along the walls of some houses at the outside. These laths are attached to the wall at equal distances from one another, and generally run from the *patapáya* up to the *barikes* or the *paladpád*, sometimes also from the *paladpád* up to the *balloloŋŋ*.

The same name is applied to the stone or plumb bob of a plumb line, used in the erection of new houses. The Iloko attach this plumb line to a beam somewhere in the center of the frame, in order to see if the house stands straight. To understand this, it should be remembered that the

building of an Iloko house starts with the planting of the posts or *adigi* and the building of the roof or *ilo*.

kulintipay. Concha, a piece of translucent shell used for window glass, generally about three inches square. The *kulintipay* are set in wooden frames or sashes (usually from two to four to each window), which are of a great variety of dimensions. These window sashes occur only in houses whose walls are made of boards, and they generally slide over the *paladpad*, at the outside, when opened or closed. (See Plate 4, fig. 19, *a*.)

(la)labáy(an). The three parallel bamboos that run horizontally at equal distances from one another, all along the roof, across all its rafters, at the inside. The real *lalabáyan* occur only in houses of the *timbóŋŋ* type (gable roof). The corresponding single bamboo, in houses of the *pinag-óŋŋ* type (hip roof), is called *balatbát*.

The term *lalabáyan* is also applied to a kind of X-shaped frame, on which cotton yarn is prepared for skeining. *Lábay* means "skein;" the suffix is a locative; the reduplication emphasizes the meaning.

ladét. Any of the supplementary rafters occasionally placed upon the ordinary rafters (*pasaŋŋir, solókan*, etc.), and reaching from the eaves up to a point at a certain distance from the top of the ordinary rafters. Wherever *ladét* occur, the ordinary rafters rest with their lower end on the inner edge of the tiebeam or pole plate (which is generally also the wall plate), while the *ladét* rest on the outer edge. (See Plate 4, fig. 20, *d*.)

In this connection it seems opportune to give the meaning of three terms, which are not genuine Iloko, and which regularly occur in documents written in Spanish.

kilo [Spanish(?) *quilo*]: ordinary rafter.

sobrekilo [Spanish(?)] sobrequilo, from the Spanish *sobre*, over, upon, and *quilo*): the same as the Iloko *ladét*.

barakilan [Spanish(?) *barequilan* or *varaquillan*]: any of the horizontal pieces of timber that cross the *sobrekilo* at regular intervals, and to which the sheets of corrugated iron, etc., are secured immediately.

laém. The principal part of the house, the house proper. This term refers only to the space between the exterior walls, while the term *kadahlán* (which see) refers to the whole building and includes the roof, the posts, etc. In some houses the *laém* has only one room that serves as sitting room, sleeping room, etc. In a perfect Iloko house, however, one or more partitions separate the sitting room, called *teŋŋáŋŋa* or *sálas*, from one or more sleeping rooms, called *silid* or *sopi*. Sometimes, especially when the *laém* has only one room, one or more annexes, called *saguimbi*, open into it and serve as sleeping rooms, storerooms, etc. *Laém* literally means "inside." (See Plate 2, fig. 8, *a*.)

lansá. (Metal) nail, (wooden) peg.

(ka)lasúg(an). Gutter, eaves channel, eaves trough. *Kalasúgan* occur chiefly inside the house; they are fixed under any place where the eaves of two slopes, pertaining to different roofs, meet each

other; for examples, between the *batalán* and the kitchen. The *kalasúgan* usually consists of one or more heavy bamboos split into halves. Other gutters are rare.

libeñg. A piece of earthenware in the shape of a *karámba* or large earthen jar, which is often found fixed near the top of each of the four posts (*siñgit*) of a granary, not far from the floor, in order to prevent rats from climbing up along the posts and entering the granary.

(li)liktád(an). A strip of rattan, a rope, etc., that prevents the ladder from falling backwards, when its top has been removed from the doorsill on which it rested, which is done to keep dogs, etc., from entering the house, and to indicate that the inmates are out or do not want visitors. *Liktád* means "removing the ladder" (as described above); the suffix is a locative; the reduplication emphasizes the meaning. (See Plate 5, fig. 21, *d*.)

lipit. The innermost of the two beams that run parallel with the tiebeams (*awánin* or *sekkég*), the *barílka*, etc., and connect two *dógo* or corner posts at the height of the floor. The outermost of the two beams is called *patapáya*. The *lipit* are covered by the flooring, while the *patapáya* serve as supports for the walling. *Lipit* means "pressing between." Cf. *(pa)tapáya*. (See Plate 5, fig. 22, *c*; Plate 6, fig. 20, *a*.)

m(in)atá or **(mata)matá.** Open-worked. Applied to woven bamboo, whether *binakál* (twilled) or *sinaxá* (checker). It is used mostly for the *pasaplák*. *Matá* means "eye;" the reduplication indicates resemblance; the infix *in* either indicates resemblance or means "made of." Cf. *tidtíd* and *(pa)saplák*. (See Plate 5, figs. 23, 24.)

óboñg. Pigsty, piggen. A small inclosure for swine, situated at some distance from the house. It consists of a miniature house of the *tinúbeñg* type, with two openings, one at each gable, both *bayañgbáyañg* being absent. Its ground plan is a rectangle, not much larger than the inclosed animal; its height is proportioned to that of the owner, so as to allow him to pass the food through the opening at the gable. The walls consist of horizontal bamboos, perforated at both ends, and kept together with vertical strips of bamboo passing through the holes. The floor, which is about one foot above the ground, generally consists of bamboos connected in the same way as those of the walls. (See Plate 6, fig. 25.)

ólo. Roof. This term includes the roofing and all the materials and construction (*atép* and *sakóg*) necessary to carry and maintain the same upon the posts (*adíŋi*) and tiebeams (*awánin* and *sekkég*). There are two kinds of roofs: the hip roof, with two trapezoid sloping sides (*bayakán*) and two triangular sloping ends (*sába*), which is typical of the *pínag-óñg* houses; and the gable roof, with two rectangular sloping sides (*bayakán*), which is typical of the *tinúbeñg* houses. *Ólo* also means "head." Cf. *p(in)ag-óñg* and *t(in)úbeñg*. (See Plate 3, figs. 10, 11.)

padiñgán. Any disconnected small extent of walling, generally about one foot in width. For example: that which covers the space between a post or *adíŋi* and the nearest upright of a door frame.

p(in)ag-óñg. A house with a hip roof. Both ends (*sába*) and both

sides (*bayakán*) of the roof are sloping, and there are no gables or *bayañgbáyañg*. *Pag-óñg* means "turtle;" the infix indicates resemblance. Cf. *t(in)ábreñg*. (See Plate 3, fig. 10.)

paladpád. Window sill. In houses whose window sashes are made of timber the *paladpád* is the lowest piece in a window frame, and it runs through from one end of the wall to the other, taking the place of the ordinary *barikes*. In houses that have shutters made of bamboo, the *paladpád* is the part of the wall below a window on which the sill *talañgkúb* rests. Cf. *talañgkúb*. (See Plate 1, fig. 3, *b*.)

pálay. Any large wooden peg stuck in an *adigí* or post, and on which rests either a *patapáya* or a *lipit*.

pandág. A kind of framework of heavy bamboos placed over a nipa roof. The bamboos that run parallel with the rafters of the *bayakán* cross one another over the *bobonñán* or ridge. The latter are sometimes, although rarely, used to keep in place the *bobonñán* of roofs thatched with cogon grass. *Pandág* also means "pressing down."

Pandág is also another name for the *talañgkúb* of the ridge.

pantéñg. A kind of hardwood very much esteemed, and used for posts, tiebeams, etc., in rich Iloko houses.

pañgarásan. The strips of bamboo which are situated here and there between the bamboos of the *dellég* (floor joists), and which run parallel with the latter. As they do not rest on any support, they merely serve to connect the different parts of the *básar*, which are tied to them. No *pañgarásan* appears in *datár* floors. This term is derived from some unknown stem (*áras* or *káras*) and the locative *pañg . . . an*. (See Plate 6, fig. 26, *d*.)

paradipad. The horizontal layer of *talób*, placed between the wall and the *bayañgbáyañg* or gable in houses of the *tinúbeñg* type. A *paradipad* extends from one *dúgo* or corner post to the other and serves as a support for the *bayañgbáyañg*. The bamboos of the *talób* run perpendicularly to the vertical surface of the wall and *bayañgbáyañg*, and, although very short, project a little inside and outside of the house.

The term *parodípad* is also more or less an equivalent of our term "bustler;" it is applied to persons who are always on the move, but in a rather clumsy way, and continually collide with pieces of furniture, playmates, etc.

paransúgay. Any of the four vertical beams of the *agámañg* or granary, that extend from the tops of the four posts (*siñgit*), at the height of the floor, to the *awanán* or tiebeams. The *paransúgay* stands in a slanting position and forms an obtuse outward angle with the *siñgit*. The eight *kidañg* and the two *awanán* or tiebeams connect the *paransúgay* with one another. (See Plate 3, fig. 12, *a*.)

p(in)aúd. Any of the lowermost *agsít* or layers of nipa leaves or cogon grass, which make up the eaves. To form the *pinaúd* the *agsít* are doubled up towards the outside, so that the tops of the leaves or grass reach the upper part of the *agsít*, where they are tied to the latter. Consequently the width of a *pinaúd* is only about one-half of that of a common *agsít*. In some roofs the *pinaúd* are replaced by double *agsít*.

payák. Either of the two ends of the *agsít* or layers of cogon

grass, which are placed over the *solókan*. The mass of cogon grass situated at both ends of these *agsít* is much thicker than that which lies in the middle; it takes an outward direction and, consequently, an alar or winglike shape, hence the name *payák*, "wing." (See Plate 6, fig. 27, *b*.)

poklő. Angle brace: any short brace, acting as a strut and connecting two of the most important parts of the frame of a house. For example: the braces that connect two tiebeams (one *awanán* and one *sekkég*), two *patapáya*, two rafters, etc. Cf. *sakóbo* and *(pa)súli*. (See Plate 6, fig. 28, *a*, *b*.)

puñgán. The two strips of bamboo that keep the cogon grass of an *agsít* in place, about the middle. They run loose across both sides of the *agsít* and are tied together only at both ends. *Puñgán* also means "pillow." Cf. *sigpit*. (See Plate 6, fig. 27, *c*.)

(pa)raáñg(an). Cf. *parañgáan*.

rákab. The strip or strips of rattan used to bind a layer of bamboo (*taléb* or *tidtíd*) to the *adígi* or posts, the *barikes*, etc. Cf. *gálut* and *biríñg*.

(pa)rákit. The bamboos or pieces of timber that run all along the eaves, covering the extremities of the rafters. (See Plate 3, fig. 10, *a*.)

The same name is applied to that part of a scaffold on which the workmen stand, and which consists of a few light bamboos tied together. A *rákit* is a raft made of a few bamboos tied together; the prefix is an instrumental.

(pa)ranggá(an). Porch, the entrance to the house or that part of the house yard where the ladder stands. It is generally covered with a *patagnáb*. A *ránga* is a large earthen jar; the prefix is an instrumental and the suffix is a locative.

(pa)rañgáw. The mortise at the top of a post (*adígi* or *sláñgit*), in which a tiebeam (*awanán* or *sekkég*) or some other piece of timber fits. A *dógo* or corner post has a double *parañgáw*, generally cut out on two neighboring sides; a *bagnábag* has a single *parañgáw*, cut either on one side or through the middle; a *sláñgit* may have a single *parañgáw* or a double one cut out on two opposite sides. The *rañgáw* are tops of young cucurbitaceous vines; the prefix is an instrumental. Cf. *tuláñg*. (See Plate 7, figs. 30, *a*; 31, *a*; 32, *a*; 33, *a*.)

(pa)rbó. The four rafters that meet the *solókan* at their upper end, near the ridge of the roof. The *parbó* occur only in hip roofs (*pinag-áñg*). See Plate 3, fig. 10, *f*.)

Parbó also means "(a house, etc.) constructed (by N.)," as opposed to "inherited."

(pa)rsá. A kind of scaffold consisting of an open-worked platform of bamboos or strips of bamboo, raised on posts and serving as a support for climbing vines, for example: bottle gourds, squashes, etc. It is an essential part of many vegetable gardens and is very often found near Ilоko houses.

ridaw. The part of the house which is situated nearest to the entrance. A person who enters the house, stands in the *ridaw* immediately after he has passed through the door. This part of the house has obviously no definite limits.

rikép. Shutter, window sash, door. The movable frame or barrier of boards or other material; not: the

opening. (See Plate 1, figs. 2, *e*; 3; Plate 2, fig. 5; Plate 4, fig. 19.)

roáñgan. Door. The opening; not: the movable frame of boards or other material. (See Plate 5, fig. 21, *g*.)

sagumaymáy. Eaves. (See Plate 3, fig. 10, *m*; Plate 4, fig. 20, *b*.)

sagumbí. Annex, lean-to, penthouse, or to-fall. A wing or extension to a building, having a single-pitch roof and projecting from a house with a double-pitch or complete roof. The *sagumbí* opens into the *ládu* or principal part of the house, and serves as a sleeping room, a storeroom, etc. It has no door communicating with the outside.

sakóbo. Angle brace: any of the braces that connect two tiebeams (one *awanán* and one *sekkég*). They are also called *poklô*, which is a more comprehensive term. (See Plate 6, fig. 28, *a*.)

sallabáwan. Ridgepole, the lower beam of the *bobonñán* or ridge of the roof. (See Plate 1, fig. 1, *d*; Plate 3, figs. 9, *j*; 10, *g*; 11, *g*; Plate 4, fig. 13, *a*; Plate 6, fig. 28, *c*.)

(sa)saloket(án). Any part of the wall, the door, etc., wherein something may be stuck. E. g.: all along the *bartkes* or *sippit*, between the latter and a wall of bamboo (*talib*). *Salokét* means "sticking something in a wall, etc.," as described above. The suffix is a locative; the reduplication emphasizes the meaning.

sánat. A kind of wooden wedge or peg used to fasten any part of the house. Specifically: the key of a scarf joint. (See Plate 7, fig. 29, *a*.)

(pag)sañgál(an). Joint, the place where two parts are joined or united. Specifically: the scarf joint in a post consisting of two pieces of timber. *Sáñgal* means "uniting;" the combination *pag- . . . an* is a locative. Cf. *kamáñgan*. (See Plate 7, fig. 29.)

(pa)sañggír. Rafter. *Pasañggír* is a generic name for all rafters. It is applied specifically to those rafters of the *bagakán* which extend from any part (except the two extremities) of the ridgepole to the *awanán* tiebeams. *Sañggír* means, "leaning against;" the prefix is an instrumental. Cf. *solókan*, *(pa)rób*, *(pa)kikít*, and *tábag*. (See Plate 1, fig. 1, *f*; Plate 3, figs. 9, *i*; 10, *e*; 11, *f*; Plate 4, figs. 13, *e*; 18, *a*; 20, *c*; Plate 6, fig. 28, *g*.)

(pa)saplák. A layer or *daplát* of open-worked or *minatá* woven bamboo that covers the rafters of some Iloko houses. It serves as a supplementary support for the thatch, and at the same time it is very ornamental and dispenses with the necessity of a ceiling or *bábeda* (Spanish: *bóveda*, vault). *Saplák* means "extending;" the prefix is an instrumental.

s(in)aré. Checker. A certain way of weaving light bamboo into large sheets, whether close-woven (*tiktik*) or open-worked (*minatá*). Each bamboo or strip of bamboo runs alternately over and under one (not two) transverse bamboo. The open-worked variety is chiefly used for roofing (*pasaplák*) and fencing purposes, to prevent chickens from entering the *bañgsál* or the garden. The close variety is sometimes used for walling purposes, in partitions, etc. (Cf. *b(in)akól*. (See Plate 1, fig. 3; Plate 5, fig. 24.)

sarúsar. Cf. *agámoñg*.

sekkég. Either of the two tiebeams which run from one *dógo* or corner post to the other, under the

lower part of the *sóba* (triangular part of the roof) or of the *bayañgbáyañg* (gable). Cf. *awanán*. (See Plate 1, fig. 1, *b*; Plate 3, figs. 9 *c*; 10, *d*; 11, *d*; Plate 6, fig. 28, *d*.)

sigpit. The two strips of bamboo that keep the cogon grass of an *agsít* in place, near the lower part of the grass (upper part of the *agsít*). They run across both sides of the *agsít* and are tied together at regular intervals. Cf. *puñgán*. (See Plate 6, fig. 27, *d*.)

The same name is applied to any couple of strips of bamboo that run across a wall or layer of *talíb*, one on each side. *Sigpit* also means "taking hold of, as with tongs."

sikañg. Cf. *bekkér*.

silíd. Room, sleeping room. A perfect Ilóko house has one or more *silíd* separated from the sitting room, *teñgñgá* or *sálas*, by one or more partitions. Both the *teñgñgá* and the *silíd* form the *laém*. (See Plate 2, fig. 8, *a*".)

(pag)silpo(án). Cf. **(pag)sañgál(an)**. *Silpó* means "uniting."

siñgit. Any of the posts of a granary and any of the supplementary posts of a house. They are generally planted in the ground and reach only the floor. The *siñgit* of a house are used to support *busóran* girders, *patapiyo* and *lipit*, etc. They are either flat at the top or jointed to the piece of timber they support in the same way as the *bayábay* are jointed to the tiebeams; sometimes, however, when they support two pieces of timber running parallel to one another, they may be jointed to them by a double *parañgáw*, cut out on opposite sides of the *siñgit*. The *siñgit* of a granary support the *paransáyay*, and mortises are cut in them to receive the tenons of the *batóñgan*. (See Plate 3, fig. 12, *e*; Plate 7, fig. 33.)

sirok. The space under the house, between the ground and the floor.

sóba. Either of the two triangular sloping ends of the roof, in houses of the *pinag-áñg* type (hip roof). A *sóba* extends from one of the *sekkég* tiebeams to the ridge of the roof. Cf. *ólo* and *bayakán*. (See Plate 3, fig. 10, *j*.)

sokdíp. Any thatch used to mend a leaking roof.

sokóg. Frame or skeleton of the roof. This term excludes the *atép* or roofing. Cf. *ólo*.

(pag)sokog(án). Arch mold of a window or doorway. *Sokóg* means "molding;" the combination *pag- . . . an* is a locative.

solókan. Any of the four rafters that connect a *dógo* or corner post with the ridgepole; in a hip roof: the hip rafter. (See Plate 1, fig. 1, *e*; Plate 3, figs. 9, *d*; 10, *l*; 11, *e*; Plate 6, fig. 28, *f*.)

sopí. Room, sleeping room. This name is applied to the *silíd* of small houses.

súli. Corner, angle.

(pa)súli. Any triangular piece of timber, which takes the place of the *pokló* or angle brace in some Ilóko houses, a kind of angle block. The *pasúli* fills the corner, while the *pokló* does not. *Súli* means "corner;" the prefix is an instrumental.

súray. Prop or stay. Any piece of timber or heavy bamboo resting at one end on the ground and at the other against a post, a wall, etc., to prevent the latter from falling or leaning.

(pa)sursúr. Any bundle of thatch that covers the ridging at regular intervals. The leaves, etc., of the *pasursúr* run in the same direction as those of the ridging, and

serve as a supplementary cover for the several spots where the ridging is tied to the beams of the ridge. *Sursúr* means "going from place to place;" the prefix is an instrumental.

(ka)sasúr(an). The part of the roof which is situated immediately over the hearth, and which is consequently covered with soot. *Sásar* means "smoking;" the combination *ka . . . an* is a locative.

(pa)tagnáb. Appentice or penthouse, a lean-to roof which is a direct continuation of one of the slopes of a complete roof, as one sheltering a staircase, a balcony, etc. Cf. *duáy*.

talákib. Roof of bamboo. This term includes only the roofing. The layers of light bamboo (*talób*) are placed in exactly the same way as the *agsít* of nipa leaves or of cogon grass.

talaŋ̃kúb. Sill, head. The *talaŋ̃kúb* is a section of bamboo split into two, and two *talaŋ̃kúb* form respectively the upper part and the lower part of a window frame, in houses that have shutters made of bamboo. Cf. *balló-loŋ̃* and *palaḍpád*. (See Plate 1, fig. 3, *a*, *b*.)

The same name is applied to any of the two bamboos that run all along and over the ridging, one at each side, in order to prevent the latter from being blown off by the wind.

taléb. The *taléb* is a layer of bamboo made of sections of light bamboo split into halves and facing one another with the concave side, in such a way as to show nothing but the convex part on both sides of the layer. Consequently, each split bamboo fits half in one opposite split bamboo and half in the next one. To keep the bamboos in place, two notches are generally made at some distance from at least one of their ends (generally the upper one), one notch at each edge, and a strip of heavy bamboo runs between both opposite split bamboos, at the height of the notches; to that strip the split bamboos are tied with strips of rattan. Where no notches are made, ordinary *sigpit* keep the bamboos in place. The *taléb* is much used for walling purposes (for outer walls, rarely for partitions), and *taléb* roofing (*talákib*) may be seen in increasing quantities. (See Plate 7, figs. 34, 35.)

(pa)tapáya. The outermost of the two beams that run parallel with the tiebeams (*awanán* or *sekkég*), the *barikes*, etc., and connect one *dógo* or corner post with the other, at the height of the floor. The innermost of the two beams is called *lipit*. The *patapáya* serve as supports for the walling. *Tapáya* means "supporting on the palm of the hand;" the prefix is an instrumental. (See Plate 2, fig. 7, *d*; Plate 3, fig. 9, *h*; Plate 5, fig. 22, *d*.)

táwa. Window.

teŋ̃gŋ̃gá. Sitting room. In some Iloko houses the *teŋ̃gŋ̃gá* covers the whole space of the *laém*, but in a perfect Iloko house one or more rooms (*silíd* or *sopí*) are separated from the *teŋ̃gŋ̃gá* by one or more partitions. This term has now very generally been abandoned for the Spanish term *sala*, which, however, is always used in its plural form, *salas*, the singular being used only to mean "dance." So also *silíd* is often superseded by *kuárto* (Spanish: *cuarto*). The term *balúy* is sometimes applied to the *teŋ̃gŋ̃gá*, and it is probably the original name,

at a time when the whole house had only one room, as is the case with the generality of the houses of the so-called non-Christian tribes. *Teñgñgá* means "middle." (See Plate 2, fig. 8, *a'*.)

tidtíd. Close-woven bamboo, as opposed to *minatá*, whether twilled (*binakól*) or checker (*sinará*). *Tidtíd* is used extensively for walling (outer walls and partitions) and flooring (*daplát*) purposes. It is generally twilled, and the checker variety occurs rather rarely, for example: in a few partitions, etc. To prepare the bamboos (light ones, of course) destined to be woven into sheets, their outer surface is first cleaned, and then they are cut into halves; after which several cuts are made lengthwise at the internodes of each half bamboo, so as to render the flattening easy; then the inner surface is cleaned, and the bamboo is ready to be woven into sheets, either *binakól* or *sinará*. (See Plate 1, figs. 2, 3; Plate 6, fig. 26, *g*.)

tóbag. The middle rafter of the *sóba* or triangular sloping end of a hip roof. This is the only rafter of the *sóba* that extends to the ridgepole. (See Plate 3, fig. 10, *i*.)

tókal. A prop, generally a section of bamboo, used to keep open a window shutter, made of bamboo, and hanging loose from an *alotoótan*, without being able to slide over it sideways. The lower end of the *tókal* rests on the *talañgkób* or window sill, and the upper end pushes the lower part of the shutter outward and upward, until the latter reaches a slanting position.

(pa)tokhób. King-post. *Tokhób* means "pushing up (from beneath);" the prefix is an instrumental. (See Plate 3, fig. 9, *c*.)

toñgkál. Cf. *tókal*.

t(in)úbeñg. A house with a gable roof. Both sides of the roof (*bayakán*) are sloping, and it forms a gable (*bayañgbáyañg*) at each end. There are no *sóba* in the roof of the *tinúbeñg*. Cf. *p(in)ag-úñg*. (See Plate 3, fig. 9.)

tukád. Rung, rundle, round, or step (of a ladder); step (of a staircase). Cf. *agdán*. (See Plate 5, fig. 21, *c*.)

tulbék. Key.

tul-óñg. Mortise. Cf. *(pa)rañgdáw*.

The same name is applied to the two heavy bamboos that are placed between the *sallabáwan* and the *pakabáyo* of the *bobóñgan* or ridge of the roof. In this case the four of them are tied together and form the *bobóñgan*.

(pa)tupék. The extremity of any part of the floor (whether timber or bamboo, whether lath, beam, or board, whether of the *dalág*, of the *básar*, or of the *datár*), which has been cut out into a more or less wedgelike shape, in order to give room to a post or *adigi*. Consequently the *patupék* surround the whole post, except the side (or two sides in a *dúgo*) that faces the wall, where the *patapáya* is fastened to it. *Tupék* means "besetting, confining;" the prefix is an instrumental.

THE ILOKO CART

bakkóko. Rib, any of the curved strips or laths of bamboo, forming the principal part of the framework of the *balawbáw*.

balawbáw. Tilt, awning, canopy, covering. The most common *balawbáw* consist of three layers: an interior one, the *pataplák*,

made of *minatá* (see the Ilokó House) or open-worked woven bamboo; a central one, made of nipa leaves; and an exterior one, the *pandáy*, similar to the first.

baŋ̃gkáy. Body or box (of a cart, of a sledge). Its bottom (*kadaʻdʻran*) is rectangular, and its sides (*didiŋ̃g*) are straight and perpendicular to the bottom. An Ilokó cart has the general appearance of an ordinary dump cart. *Baŋ̃gkáy* also means "dead body of a person;" originally: "the beheaded body."

bekkér. Cf. *burayóŋ̃gan.*

burayóŋ̃gan. The wooden axle or axletree of a *palakŋpák* or springless cart; it revolves with the wheels. The axle of a cart furnished with springs is usually called by its Spanish name: *eje.*

(pa)dapán. Runner (of a sledge). The same name is applied to the clawlike part of a sewing machine, through which the needle passes up and down. *Dapán* means "sole of the foot;" the prefix is an instrumental.

(ka)dsaʻr(an). Bottom (of a cart), bed (of a sledge). That part of a vehicle on which the load is placed. Cf. the same term under the Ilokó House.

dídiŋ̃g. Side (of a cart, of a sledge). The four sides of the *baŋ̃gkáy.* Cf. the same term under the Ilokó House.

(ga)gan-áy(an). Either of the two heavy bamboos that run along and cover the *ŋ̃gárah* or upper border of both ends, in front and at the back, of the *baŋ̃gkáy* or body of a cart.

The same name is applied to a warping device and to a constellation. *Gan-áy* means "warping;" the suffix is a locative; the reduplication emphasizes the meaning. Cf. *luŋ̃ggáŋ̃gan.*

guyúd(an). The rope or ropes attached to the fore end of a sledge, a plow, etc., and used to pull the latter. *Gúyud* means "pulling;" the suffix is a locative. Cf. *tali* and *kalombída.*

ikiŋ̃g. Either of the two edges of the *ŋ̃gárah* or upper border of the *baŋ̃gkáy* or body of a cart.

kalasikas. The iron tire or rim of a wheel.

kalláwit. Hook.

kalombída. The rope with which the yoke is fastened to the shaft of a cart.

kasiŋ̃ggáy. A small piece of wood or bamboo placed transversely over or against the two parts of a repaired shaft, pole, etc. When the shaft of a cart, for example, is broken, the Ilokó place a similar piece of bamboo longitudinally against the remaining stump, in such a way as to double the shaft for a certain length, at the joint; then they place the *kasiŋ̃ggáy* over or against both bamboos, the old stump and the new addition, and finally tie the whole outfit together with rattan. (See Plate 7, fig. 38, a.)

kuribut. A receptacle for the lamp, the *búŋ̃ga* or cooking pot, the ladle, etc. It is generally made of woven bamboo, and hangs somewhere at the *dídiŋ̃g* of the cart, at the outside.

l(in)áŋ̃gub. Cf. *balasebáw.*

(pa)likúd. The back end of the *baŋ̃gkáy* or body of a cart, namely: that part of the *dídiŋ̃g* which is detached when the contents of the cart are dumped. *Likúd* means "back, behind;" the prefix is an instrumental.

línoŋ̃g. Cf. *balasebáw. Línoŋ̃g* also means "shade."

lúgan. Vehicle. A general term, applied also to small boats. Most all vehicles used by the Ilokó on

land, except the *palakapák*, the *pasayád*, and the *vínda*, are known only by their Spanish names. In the following list, the vowels retain their Spanish pronunciation:

bagón. Wagon. From the Spanish *vagón*.

bisíkléta. Bicycle. From the Spanish *bicicleta*.

ferokaríl. Railroad. From the Spanish *ferrocarril*.

kalésa. A kind of two-wheeled calash, opening at the back. From the Spanish *calesa*.

karesón. Cf. *karetón*.

karetéla. A kind of dogcart. From the Spanish *carretela*, a kind of calash.

karetón. A kind of dump cart. From the Spanish *carretón*.

karomáta. A kind of two-wheeled chaise. From the Spanish *carromata*, which rather represents the Iloko *karetéla*.

kárro. A four-wheeled vehicle without body, either tilted or not, used for floats, for carrying coffins, etc. From the Spanish *carro*, cart.

kótse. Railroad car, automobile. From the Spanish *coche*, coach.

óto. Cf. *otomóbil*.

otomóbil. Automobile. From the Spanish *automovil*, or the English *automobile*.

tren. Train. A Spanish term.

Half Spanish, half English:

motorsíklo. Motorcycle. In Spanish: *motocicleta*.

English:

trák. Bus. From the English *truck*, with identical pronunciation.

luñgáñgan. Either of the two heavy bamboos that run along and cover the *ñgárab* or upper border of both sides of the *bañgkáy* or body of a cart. Cf. *(pa)gandápan*.

ñgárab. The upper border of the *bañgkáy* or body of a cart. The same name is applied to the rim or brim of a jar, a basin, etc.

ñgípen. Tooth (of a harrow, a sugar mill, a bow net, etc.). *Ñgípen* also means "tooth (of men and animals)."

páko. Yoke. It consists of a piece of wood curved in the middle; both sides are tied to the shafts of the cart by means of ropes, called *kalombída*. The yoke simply rests on the neck of the animal, a carabao or a cow, without further attachment.

palakapák. Springless cart. A *karetón* without springs. The typical Iloko cart described in this paper. A spring is called *muélle*, from the Spanish *muelle*.

palaopó. Nave or hub (of a wheel).

pallatíwan. Either of the two thills or shafts, between which the animal is hitched.

pandág. The exterior layer of the *balawbáw*. It covers the nipa leaves and consists of open-worked woven bamboo or *minatá*. Cf. the same term under the Iloko House.

pannúbek. Any of the four vertical pieces of timber or bamboo that connect the runners of a sledge with its bed or body, at each corner. Probably from the stem *súbek* or *túbek*, and the instrumental prefix *pañg-*, changed into *pan* (*n* reduplicated here) through its combination with the initial letter of the stem.

(pa)pañgál(an). Step (of a vehicle).

The same name is applied to the hock of an animal.

paŋ̃ggo(én). To drag, to haul (any heavy load, without the aid of any vehicle). This is done by one or more carabaos, cows, etc. From the stem *paŋ̃ggó* and the suffix *en* of substantival verbs.

paraggág. Cf. *bakkáka*. *Paraggág* also means "rib (of men and animals)."

payát(an). Cf. (*pa*)*paŋ̃gálan*. *Páyat* means "treading upon;" the suffix is a locative.

pilíd. Wheel, cart wheel. The typical Iloko cart wheel is solid and has no spokes. A spoke is called by its Spanish name *rayo*, generally in the plural: *rayos*. The felloes are called *sinta*, from the Spanish *cinta*.

s(in)ábeŋ̃g. A shutter used to close the *balawbáw*, at the back. It is sometimes provided with a small window.

(pa)sagád. Sled or sledge. It consists of a *baŋ̃gkáy*, which, by means of four *pannúbek* or posts, rests on *padapára* or runners, instead of on *pilíd* or wheels. It has no *pallatíwan* or thills, but is pulled by means of a rope, called *gayúdan*. The *balawbáw* is generally absent. *Sagád* means "harrow;" the prefix is an instrumental. Cf. *ulnás*.

sagpát. A contrivance of woven bamboo, generally suspended from the *balawbáw*, at the inside, towards the back. It is used as a receptacle for pillows, blankets, clothes, etc. *Sagpát* also means "ascending slope."

saŋ̃gól. Cf. *páko*.

(pa)saplák. The interior layer of the *balawbáw*; it is covered by the nipa leaves and consists of open-worked woven bamboo or *sínata*. Cf. the same term under the Iloko House.

talí. Rope. The reins are called *rienda*, a Spanish term. Cf. *gayúdan* and *kalombúla*.

tambúbuŋ̃g. Cf. *balawbáw*.

tuguŵ. Seat; box (of the driver).

ulnás. Sled or sledge. The *ulnás* has no *baŋ̃gkáy*, it consists of a simple bed resting on runners, by means of four *pannúbek*. For the rest it is identical with the *pasagád*.

ILLUSTRATIONS

Plate 1

Fig. 1. Tiebeams and rafters; *a, awanán; b, sekkég; c, bekkér; d, sallabáwan; e, solókan; f, pasaŋ̃gír.*

2. Shutter seen from outside; *a, awanán; b, dógo; c, rikép ti táwa; d, baútek; e, balatbát; f, alotoótan; g, alintúboŋ̃.*

3. Shutter seen from inside; *a, tataŋ̃kúb* applied to *ballóloŋ̃; b, tataŋ̃kúb* applied to *paladpád; c, balunét.*

Plate 2

Fig. 4. Fence with gate; *a, baŋ̃gén.*

5. Bar closing window; *a, baŋ̃kil.*

6. Clamp; *a, baŋ̃kil.*

7. Principal beams of wall; *a, dógo; b, awanán* or *sekkég; c, barikes; d, patapáya.*

8. Floor plan of a house; *a, kadaklán* or *laém; a', teŋ̃gŋ̃gá; a'', sillá; b, batalán; c,* kitchen; *d, baŋ̃gsál.*

Plate 3

Fig. 9. House with gable roof; *a, dógo; b, bayábay; c, patokbób; d, solókan; e, sekkég; f, awanán; g, barikes; h, patapáya; i, pasaŋ̃gír; j, sallabáwan; k, bayakán; l, bayaŋ̃báyaŋ̃.*

10. Hip roof; *a, parákil; b,* removed *solókan* showing *c; c,* tenon of *dógo; d, sekkég; e, pasaŋ̃gír; f, parbó; g, sallabáwan; h, pakikit; i, tóbag; j, sóba; k, bayakán; l, solókan; m, sagumaymáy; n, awanán.*

11. Gable roof; *a,* tenon of *dógo; b, bayakán; c, awanán; d, sekkég; e, solókan; f, pasaŋ̃gír; g, sallabáwan.*

12. Granary; *a, paranságay; b, kádaŋ̃; c, awanán; d, batáŋ̃gan; e, siŋ̃gíl.*

Plate 4

Fig. 13. Ridge of a roof; *a, sallabáwan; b, pakabáyo; c, pasaŋ̃gír.*

Figs. 14 to 17. Ornaments.

Fig. 18. Rafter and tiebeam; *a, pasaŋ̃gír; b, awanán* or *sekkég; c, pakokó.*

19. Window sash; *a, kutintípay.*

20. Rafters; *a,* tiebeam or pole plate; *b, sagumaymáy; c, pasaŋ̃gír; d, ladét.*

Plate 5

Fig. 21. Removed ladder; *a, baútek; b, agdán; c, tukád; d, lidiktádan; e, patapáya; f, adigí; g, roáŋ̃gan.*

22. Lower beams of wall; *a, dógo; b, bayábay; c, lipít; d, patapáya.*

23. Openwork woven bamboo (twilled).

24. Openwork woven bamboo (checker).

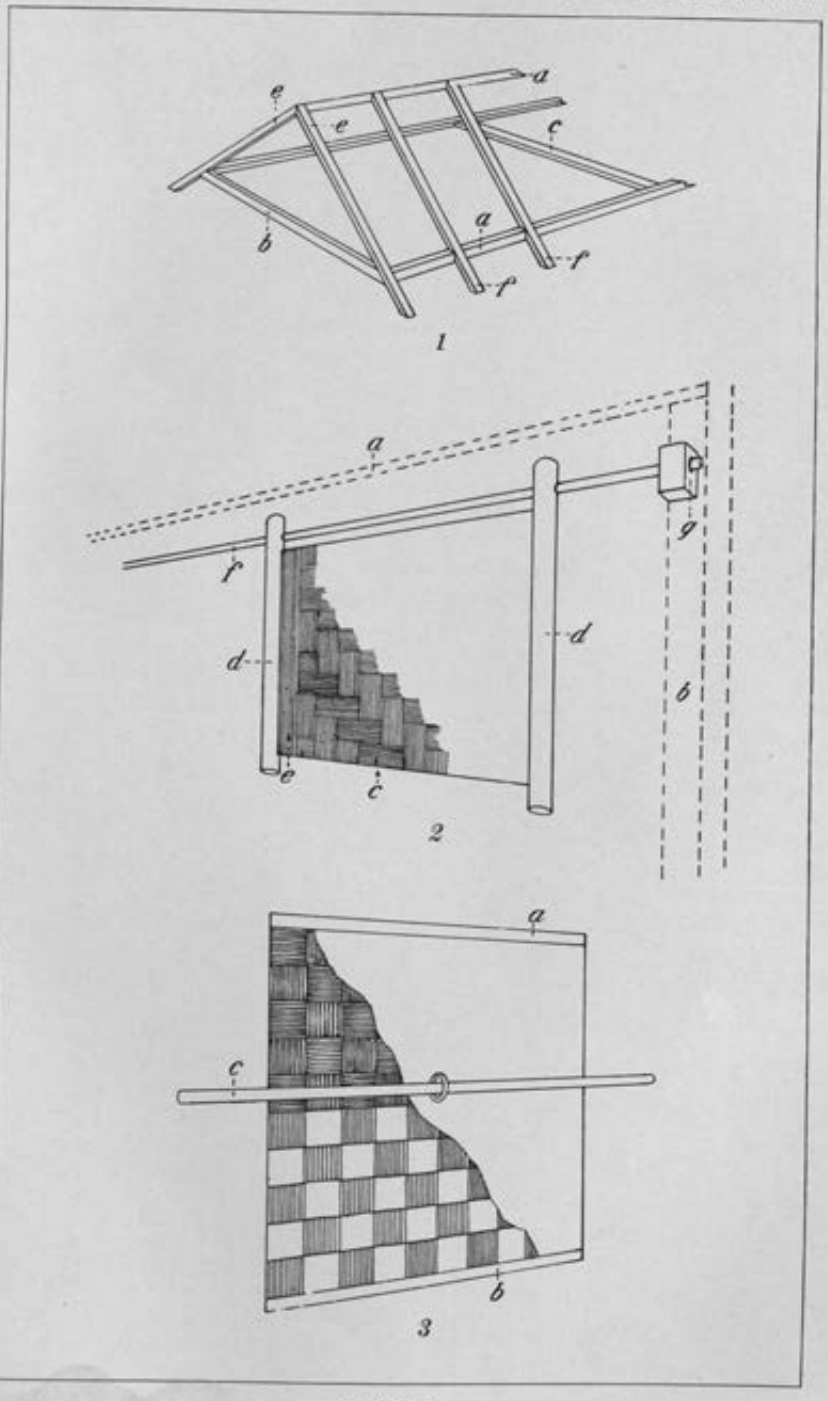
PLATE 6

FIG. 25. Pigsty.
26. Flooring; *a, lipit; b, busáran; c, dellég; d, paŋŋarázan; e, básar; f, akílis; g, daplát.*
27. Thatch; *a, ogsit; b, payák; c, puŋŋán; d, sigpit.*
28. Braces; *a, pokló* or *sakóbo; b, pokló; c, awandán; d, sekkég; e, sallabáwan; f, solókan; g, pasaŋŋgir.*

PLATE 7

FIG. 29. Scarf joint; *a, sánet.*
30. Mortise and tenon of a *bayábay* post; *a, paraŋŋáw.*
31. Mortise and tenons of *bayábay* post; *a, paraŋŋáw.*
32. Mortises and tenon of a *dógo* post; *a, paraŋŋáe.*
33. Mortises and tenon of a *siŋŋit* post; *a, paraŋŋáe.*
34. Walling.
35. Bamboo of walling.
36. Repaired shaft; *a, kusiŋŋgáy; b,* broken *pallatiwan.*

PLATE 8. AN ILOKO HOUSE



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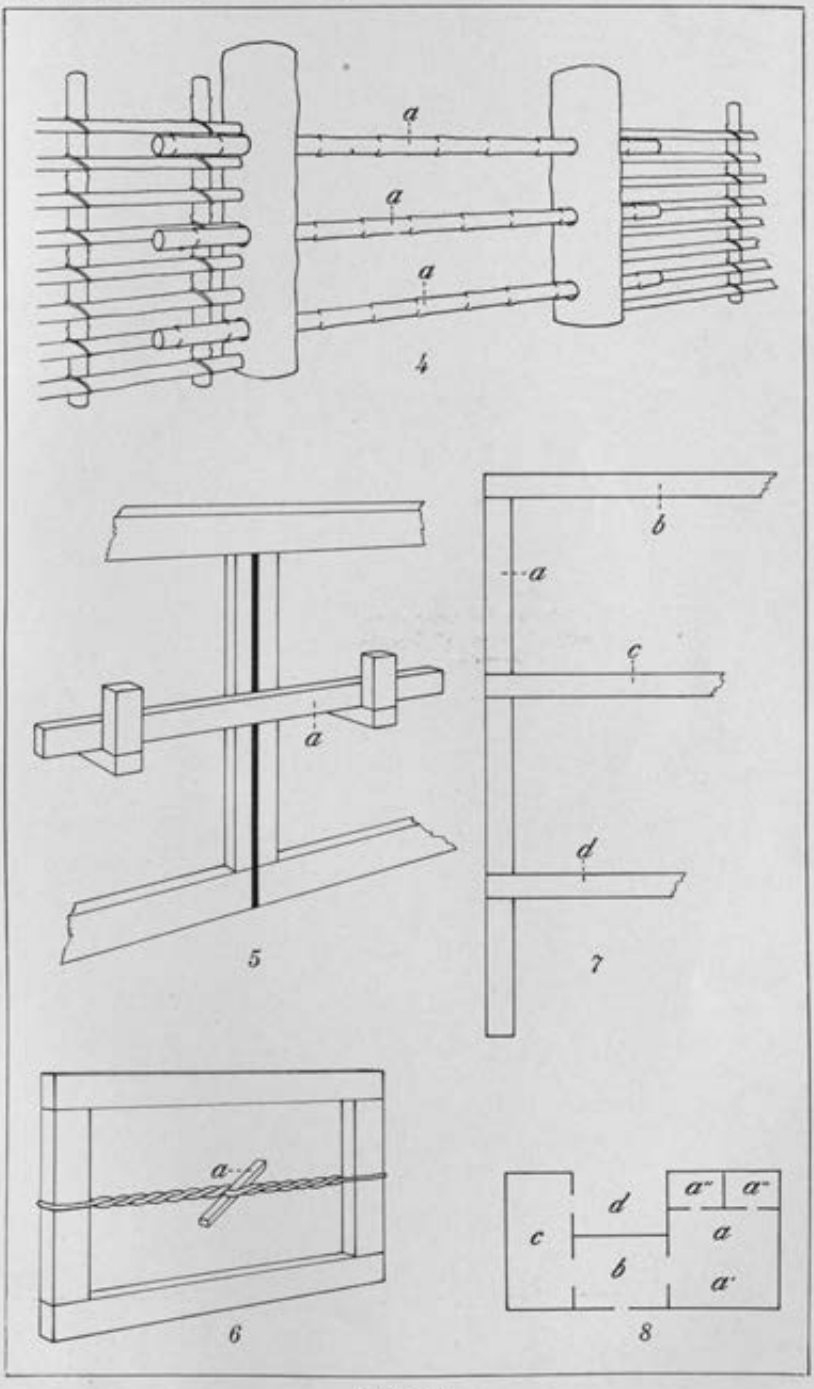

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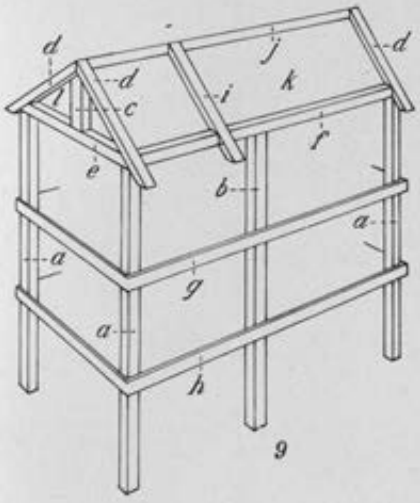

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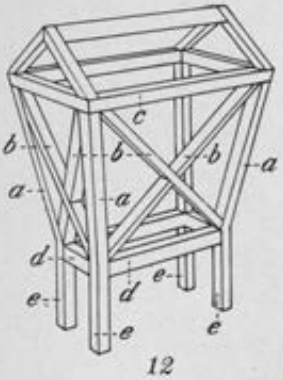

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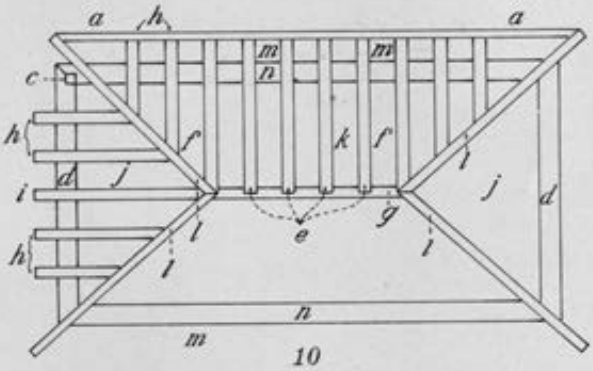

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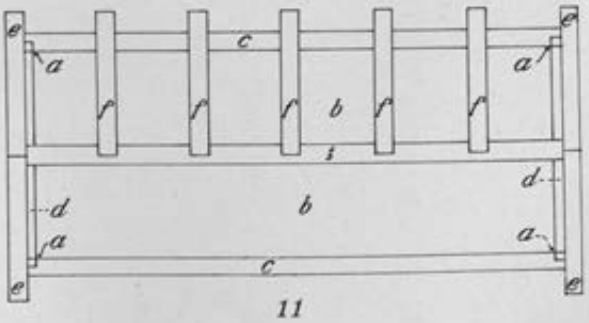

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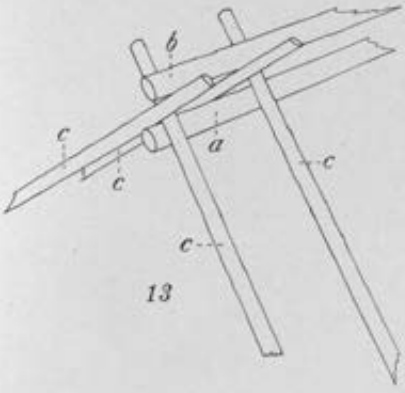

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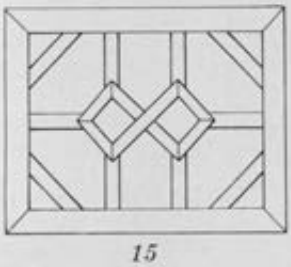

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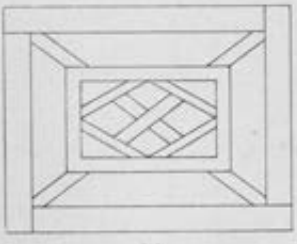

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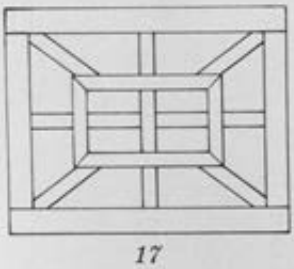

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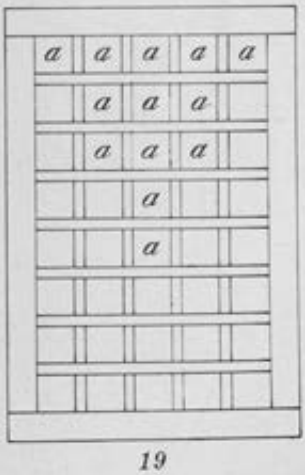

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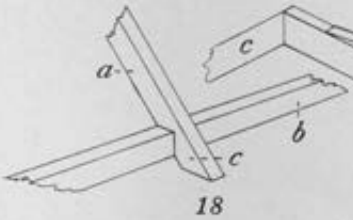

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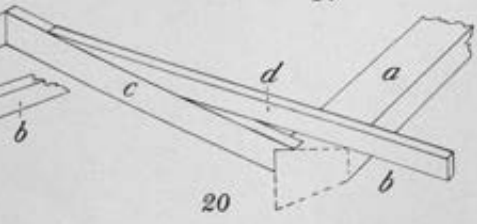

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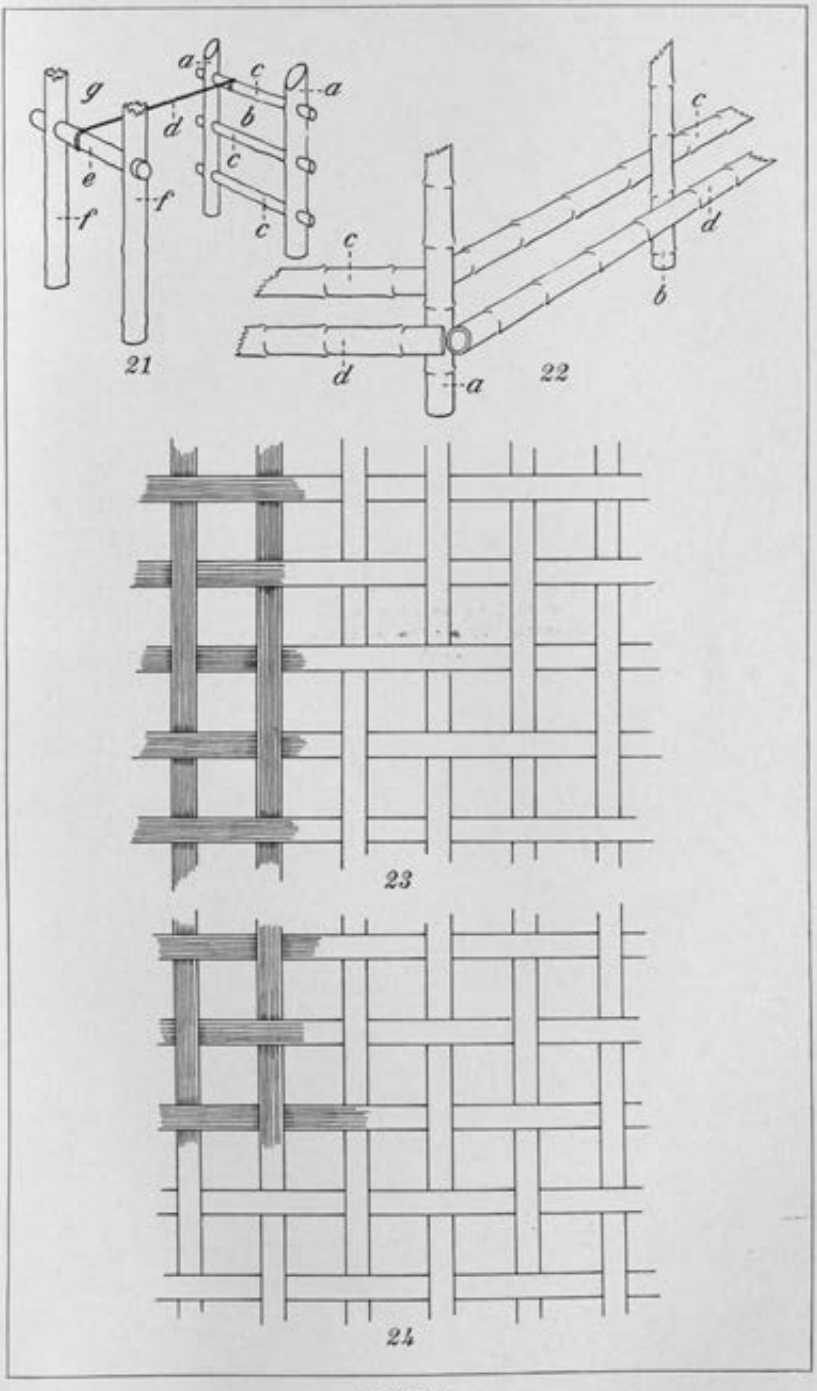

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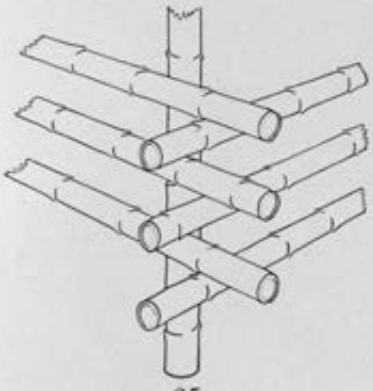

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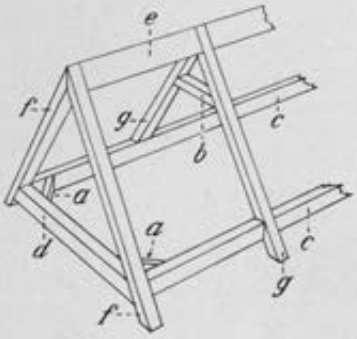

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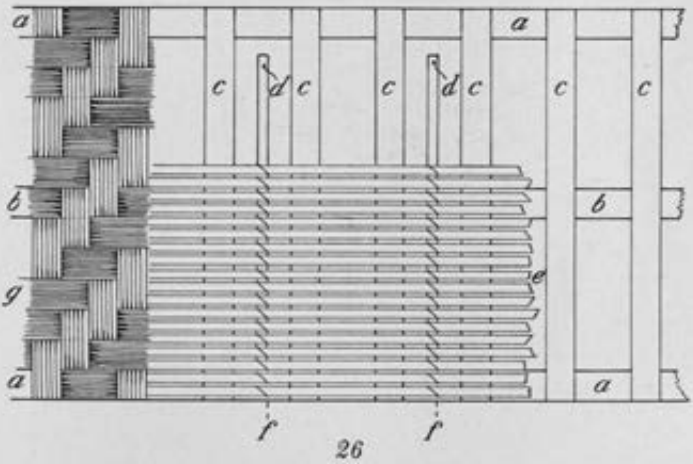

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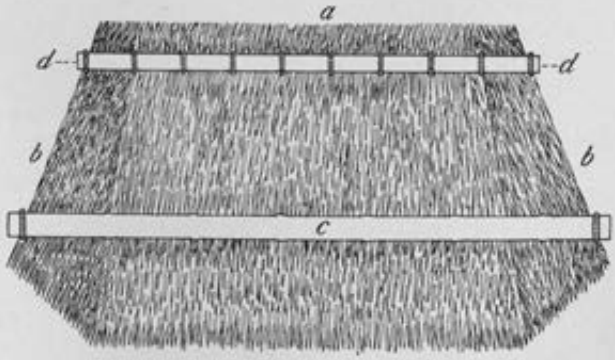

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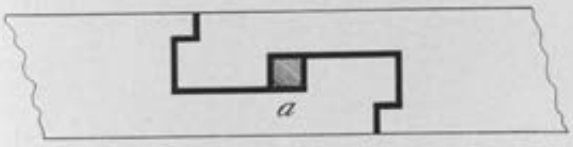
PLATE 6.



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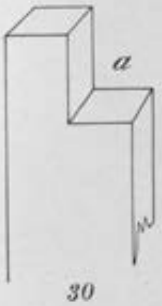

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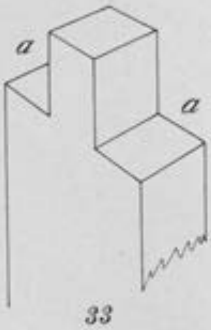

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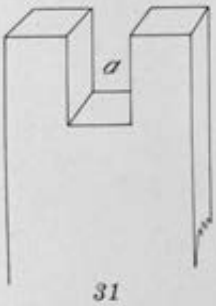

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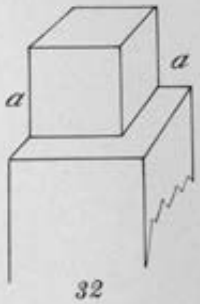

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PLATE 7.

PLATE 3.

THE NUTRITIVE VALUE AND COST OF THE PHILIPPINE CONSTABULARY RATION [1]

By Isabelo Concepcion

Of the Section of Nutrition, National Research Council of the Philippine Islands; and the Department of Physiology and Biochemistry College of Medicine, University of the Philippines Manila

The proper feeding of an army presents many considerations. The most important is the available food supply. Other important problems are presented by storage, prevention of spoilage, and the preparation of food. It is the duty of those who are responsible for the feeding of the troops to maintain such a balance of the essential food elements as will safeguard health and increase vigor. The relative proportions of proteins, fats, and carbohydrates, the amount of mineral salts, and the so-called vitamins must be considered. A certain amount of roughage is also necessary to promote regular intestinal movements.

Food is generally measured in calories. Energy is supplied in the form of fats, proteins, and carbohydrates. The proportions of fats and carbohydrates in the diet are as a rule immaterial, if enough energy is furnished to meet the demand of the organism; proteins, on the other hand, are necessary for the growth and repair of body tissues. If the diet does not furnish enough protein, growth is stunted and an inferior individual is produced.

While the mineral salts are not sources of energy, they are just as necessary as are proteins, carbohydrates, and fats. They are, in fact, indispensable to growth and proper nutrition. The human body is constantly losing minerals, and this loss must be replaced through diet; otherwise good health cannot be maintained. The current belief that a diet satisfactory in all other respects will contain the necessary minerals in sufficient quantities is not supported by fact. An adult individual whose tissues are fully formed need replace only the minerals that are

[1] The expenses of this investigation were defrayed by a special grant furnished by the National Research Council of the Philippine Islands.

continually excreted. Children, however, require additional proteins as a "growth quota" to insure the proper growth of the skeleton. There is evidence that mineral elements have other functions in growth that are not so well understood. The effect upon the development of bones of a diet deficient in mineral salts is well known; the degree to which growth and gain in weight are influenced by the mineral salts in the diet is not so generally appreciated.

Besides the energy-yielding foods and the minerals, the substances called vitamins have very specific properties for promoting growth and health. Vitamins are indispensable constituents of an adequate diet. In the words of Professor Sherman (1925), "All nutrition work, to be worthy of our knowledge and opportunity, must stand four square upon equal recognition of calories, protein, mineral elements, and vitamins." Although the vitamins are known to be essential for growth and health, it is not possible to include them in an analysis, because not all of them can be measured quantitatively. The relative value of many foods as sources of vitamins is now fairly well established through animal experimentation. In judging, however, the adequacy of the vitamin in man's diet, the best that can be done at present is to see how liberally the foods that are especially good sources of the various vitamins are included.

Under ordinary conditions of life people select their food according to their taste and appetite. Due to the instinct of self-preservation the selections are sufficiently varied to result in an adequately balanced diet. In the case of an army, however, the men do not choose their food. The food is placed before them in the mess, and they may eat it or leave it. It is, therefore, of the utmost importance that the food supplied to them be wisely selected and prepared so as to preserve or increase its nutritious and appetizing qualities. Hence, frequent changes of menu are desirable and necessary.

The object of the present investigation is to study the adequacy of the food given to the Philippine Constabulary soldiers and to compare it with the food given to soldiers in other countries.

REVIEW OF PREVIOUS LITERATURE

The information available about army rations in this country is very meager. The first comprehensive study was made by Chamberlain (1911) in connection with his study of beriberi among the Philippine Scouts.

PLAN OF THE WORK AND SOURCES OF DATA

The present survey was undertaken at the Manila Garrison, in Gagalangin, about 2.5 kilometers from Manila; and at Camp Murphy, in Cubao, Mariquina, about 7.5 kilometers from Manila. The food given to the 729 men at these camps for one week has been studied quantitatively.

A detailed account was made of all food materials purchased each day, and of those obtained from the camp stock, such as rice, canned goods, cocoa, coffee, etc. The actual weight and cost of each item brought from the market or taken from the stock were carefully noted. In addition, all kitchen and table waste and all left-overs were collected and weighed. The weight of these was subtracted from the total weight as purchased. The difference represented the actual amount of food consumed. From the amount thus obtained, calculation of the nutritive value of the food intake was made by the method elaborated by E. Hawley (1929), which provides for the calculation of the energy, protein, calcium, phosphorus, and iron in the diet, and is designed for food as purchased. The food materials not given in the table of Hawley were not included in our short-cut method, but are evaluated separately according to the tables of composition prepared by Hermano (1932), Santos and Adriano (1929), Valenzuela (1928), Adriano and de Guzman (1931), Marañon (1935), and Sherman (1927).

RESULTS

The results of the survey are summarized in Tables 1 to 6.

TABLE 1.—*Per capita intake of food by the Constabulary soldiers during one week at the Manila Garrison and Camp Murphy.*

Average weight of soldier, kg	55.8
Calories:	
Total	3,731.21
Per kg of body weight	67.47
Protein:	
Total	116.9
Per kg of body weight	2.11
Calcium, g	0.347
Phosphorus, g	1.23
Iron, g	0.015

TABLE 2.—*Total calories, total protein intake, cost per capita per day, and cost per 1,000 calories of food taken.*

Total calories	3,731.21
Protein, g	116.9
Cost per capita per day, centavos	27.2
Cost per 1,000 calories, centavos	7.3

TABLE 3.—*Distribution of food intake in percentage of total calories.*

	Percent of total calories.
Cereals and grains	67.94
Milk and dairy products	2.3
Vegetables and fruits	7.4
Fats and oils	4.6
Sugar and sweets	6.8
Meat, fish, eggs, etc.	10.4
Miscellaneous	0.56

TABLE 4.—*Distribution of proteins according to sources.*

Vegetable protein in per cent of total protein	64.1
Animal protein in per cent of total protein	35.9

TABLE 5.—*Distribution of expenses of different food groups in percentage of the total cost.*

Cost per capita per day, centavos	27.2
Cereals and grains, per cent	36.9
Milk and dairy products, per cent	3.6
Vegetables and fruits, per cent	13.3
Fats and oil, per cent	1.4
Sugar and sweets, per cent	5.4
Meat, fish, eggs, etc., per cent	37.4
Miscellaneous, per cent	2.0

TABLE 6.—*Number, age, height, and weight of men studied.*

Men studied	729
Average age, years	23.13
Average weight, kg	55.3
Average height, cm	164.48

ENERGY REQUIREMENT OF THE SOLDIER

The amount of heat necessary to meet the daily demand of our bodies, even during rest, is supplied by the food we eat each day. In approaching the question of energy requirement one must bear in mind that energy expenditure is influenced by several factors—age, sex, race, occupation, muscular activity, etc. In estimating the amount of energy expended by the body, there are four main factors to be considered: The basal metabolism; maintenance of body temperature; the increase of metabolism due to the specific dynamic action of the food; and muscular activity.

The determination of the amount of work done by the soldier is divided into two parts: The amount of work done during the

training period; the amount of work done during action. Since the training period is approximately uniform, and since the conditions are most favorable for the determination of the energy expenditure, more was learned concerning this phase than concerning actual fighting conditions. During action the amount of energy expended varies more or less with the individual, and the exact amount cannot be measured because of the urgency of the situation.

Lusk has calculated for American soldiers that 4,000 calories are sufficient to maintain body weight and to supply the necessary energy for a seasoned soldier weighing 70 kilograms (154 pounds), and carrying a pack weighing 44 pounds, to make a forced march of 30 miles in ten hours. Rockwood (1925) gives the following figures for the United States soldiers whose average weight is only 146 pounds:

TABLE 7.—*Calories expended.*

	Calories.[a]	Corrected calories.	
		For Americans.[a]	For Filipinos.[b]
Basal metabolism	1,767	1,695	1,494
Energy standing	118	110	106
Walking 10 hours, 3 miles per hour	1,703	1,606	1,552
Walking with pack, 20 kg.	484	484	348

[a] Figures taken from Rockwood.

[b] Calculation by the present author based upon the height and weight of Philippine Constabulary soldiers from the estimates given by Lusk.

Comparison of the average caloric intake of the Philippine Constabulary soldiers with the average food consumption of the United States Army in the training camp, as given by Murlin and Hildebrandt (1919), shows that the average food consumption of our soldiers compared favorably with the American. The above authors found in their investigation in 427 messes an average of 58.7 calories per kg body weight, while my findings on the Philippine Constabulary soldier were 67.47 calories per kg body weight. Compared with the average caloric value of the basal ration of the Philippine Scouts, the caloric value of the diet of the Constabulary is as good as the American, if not better, as shown in Table 8.

TABLE 8.—*The per capita food intake of the Constabulary soldier, United States Army Training Camps, and Philippine Scouts.*

Organization.	Average weight.	Calories.		Protein.	
		Total.	Per kg.	Total.	Per kg.
	kg.				
Philippine Constabulary	55.3	3,731.21	67.47	116.9	2.11
United States Army Training Camps.	66.4	3,896.0	58.7	129.0	1.94
Philippine Scouts	55.0	3,672.0	66.7		

These figures, of course, do not cover the entire amount of food consumed, since many of the soldiers in the camp supplemented their meals by buying food from the post exchange or stores around the camp. A study of the amount consumed by each soldier was not possible on account of the meager data available at the post exchange at the time of the survey.

PROTEIN REQUIREMENT

How much protein does an average Filipino soldier need? In the answer to this question three points must be considered in the light of present day knowledge, according to McLester (1927):

The quality or biologic value of the protein consumed;

The distinction between the minimum and the optimum as applied to protein intake;

The criteria by which "health and vigor" are judged, whether by a sense of well-being with efficient accomplishment of work experienced during limited periods or by the preservation of youthful vigor with comparative freedom from disease during an appreciable fraction of the person's life.

There is no agreement as to the amount of protein required in the diet. The point at issue is whether a high protein intake is preferable to a low protein intake, which such authorities as Chittenden and Hindhede have shown can be maintained for long periods without harm. More research is necessary to settle this controversial question.

During the World War an attempt was made to keep the protein components as high as possible in spite of the necessary food restrictions. This standard, according to Rockwood, may

be due to two causes: "(1) some of the men of the various armies were used to a high protein diet; and changing their food habits in war time would be one factor in lowering their morale; and (2) that a high protein diet adds to one's strength, endurance and vitality, which is one of the arguments, very difficult to prove, but often advanced, in favor of the higher protein value."

Table 8 shows that the average protein intake of the Philippine Constabulary soldier was 116.9 grams per day and 129 grams in the United States Army in training camps. Although at first glance the average intake of the Americans is greater than that of the Filipinos, in terms of protein per kilogram body weight the Filipinos have an average intake of 2.11 grams and the Americans 1.94 grams. Another thing to be taken into consideration is the distribution of protein according to sources. Table 4 shows that 64.1 per cent of the total protein is derived from vegetables and only 35.9 per cent is derived from animals. This figure is rather low compared with that of the animal protein consumed by the Americans.

THE DISTRIBUTION OF FOOD CONSTITUENTS IN THE DIET OF THE PHILIPPINE CONSTABULARY

In studying the nutritive value of a given diet, very little attention is paid to the proportions of its protein, fat, and carbohydrate. The correct amount of fat and carbohydrate in a given diet is difficult to determine. The investigations of Krogh and Lindhard (1920) showed that there is an appreciable loss of energy in working on a fat diet. They found that the waste of energy from fat was 11 per cent of the heat of combustion of fat. In the ordinary mixed diet, which contains a large amount of carbohydrates, the amount of waste on this basis was quiet small. Another reason why a high fat diet is not desirable is its high cost, since fat comes largely from animal sources, and is therefore more expensive than the grain products that furnish the bulk of the carbohydrates in our diet. It seems that the relative amount of fat and carbohydrate necessary in the ordinary diet depends more on economic factors and individual taste than on nutritional requirement.

TABLE 9.—*Constabulary ration compared with the ration of the different allied armies.**

Organization.	Protein.	Fat.	Carbohydrates	Calories.			
				Total calories.	Protein.	Fat.	Carbohydrates.
	g.	*g.*	*g.*		*Per cent.*	*Per cent.*	*Per cent.*
Philippine Constabulary.	116.9	94.23	579.41	3,731.21	12.85	23.49	63.66
British Home Ration, May, 1918.	124.0	136.0	419.0	3,453.0	14.6	36.4	49.0
Canadian, July, 1918	107.0	118.0	344.0	2,946.0	14.9	37.2	47.9
French Normal, March 29, 1918.	138.0	93.0	467.0	3,604.0	15.7	25.3	59.0
Italian Territorial, February, 1917.	127.0	38.0	469.0	2,797.0	18.6	12.4	68.8
United States Garrison, Ration A. R. 1221.	147.0	174.0	642.0	4,859.0	12.85	33 3	54.2
Consumed in United States Training Camps, 427 messes and canteen purchases.	129.0	136.0	645.0	3,898.0	13.0	31.0	56.0

* From Marlin and Hilderbrandt, Am. Journ. Physiol. 49 (1919) 531.

Table 9 shows that the percentage of protein intake of the Philippine Constabulary compares favorably with the United States garrison ration and in some respects with the mess ration of the United States Training Camps; but it is very much lower than that of the other armies of the world, especially the Italian. On the other hand, the percentage of fat compares favorably with that of the Italian Territorial Army but is very much inferior to that of the European and United States Armies. In percentage of carbohydrates, the Philippine Constabulary also compares favorably with the Italian army. These two armies are characterized by a high proportion of carbohydrates in their ration. Carbohydrates in the Italian army ration are 68.8 per cent of the total calories, and of the Philippine Constabulary, 63.6 per cent.

MINERAL REQUIREMENT

Mineral salts play an important rôle in an adequate diet. There are ten or more mineral elements needed by the body. Only three were included in this survey; namely, calcium, phosphorus, and iron. Calcium and phosphorus are essential for bone and tooth development. Iron is necessary for the formation of hæmoglobin. The human body is constantly losing minerals, and this loss must be replaced by proper diet; otherwise good health cannot be maintained.

Table 10 shows the average amount of calcium, phosphorus, and iron intake.

TABLE 10.—*Mineral intake of Philippine Constabulary soldiers compared with the Sherman standard.*

	Calcium.		Phosphorus.		Iron.	
	Amount.	Percentage of standard.	Amount.	Percentage of standard.	Amount.	Percentage of standard.
	g.		g.		g.	
Standard (Sherman) of safety.	0.68	100	1.32	100	0.015	100
Philippine Constabulary..	0.347	51	1.23	93	0.015	100
United States Army ration.*	0.711	104	2.17	164	0.029	194

* Blatherwick, N. R., Am. Journ. Physiol. 49 (1919) 561.

Table 10 shows that the calcium intake of the Philippine Constabulary soldier is only 51 per cent of the Sherman standard of safety. Although Sherman believes that 0.44 gram of calcium is sufficient to maintain the calcium balance in an adult individual—and this belief is corroborated by Santos (1935) in the case of women—he considers that the amount of calcium for safety should be 0.68 gram per day. It is evident, therefore, that the calcium intake of the Philippine Constabulary soldiers is not even sufficient to maintain calcium balance. The very limited use of milk and dairy products in the diet of the Filipino people and the insufficient intake of green, leafy vegetables result in this low calcium intake. In the case of adults there may be prolonged deficiency of calcium in the diet without the appearance of symptoms, because the losses from the blood and soft tissues may be replaced by calcium withdrawn from the bones. Bauer and his associates (1929) postulated a hypothesis that the bone trabeculæ may readily give up calcium to meet the needs of the body as a whole. If we add to this the effect of sunlight on the calcium of mobilization, it is not strange that, even with a low calcium intake, Filipinos do not show symptoms of calcium deficiency.

The phosphorus intake constitutes only 93 per cent of the Sherman standard. In the phosphorus-balance experiments carried out by Sherman he found that an average of 0.88 gram per 70 grams of body weight is sufficient to maintain phosphorus balance in an adult individual. The iron intake compares favorably with the Sherman standard.

PERCENTAGE DISTRIBUTION OF NUTRIENTS IN RELATION TO TOTAL CALORIES

Table 3, summarizing the percentage distribution of nutrients in relation to total calories, shows that one of the characteristics of the Oriental diet in contrast to the Occidental, is the predominance of grain products. The percentage distribution of grain products in the case of Philippine Constabulary soldiers is 67.94 per cent, compared with that of the low-cost American diet as given by Sherman, which is 37.79 per cent of the total calories. On the other hand the calories derived from milk and dairy products constitute only 2.3 per cent of the total calories as compared with 9.05 per cent of the low-cost American diet. The same thing can be said of fruits and vegetables; these comprise only 7.4 per cent in the case of the Philippine Constabulary, compared with 12.9 per cent in the low-cost American diet.

DISTRIBUTION OF EXPENSES

Although no satisfactory standard for the distribution of expenses for the various food groups can be given with certainty, because of the many factors involved; such as habits of the individual, availability, and market price; it was suggested by some authorities in nutrition in the United States (1919) that about one-fifth of the food budget be spent on each of the five groups: Meat, fish, and eggs; milk, cream, and cheese; fatty foods, sweets, and miscellaneous foods; cereals; fruits and vegetables. It is interesting to see how the results of the present survey vary from this standard. In Table 5 the distribution of expenses for the different food groups in percentage of the total cost is summarized. In that table the per capita cost per day for each soldier is only 27.2 centavos, and the average cost per hundred calories is 7.3 centavos per day. In the percentage distribution of expenses the most striking finding observed is that 37.4 per cent of the total expenses is alloted to meat, fish, and eggs, which is even higher than the amount expended on cereal and grains, which is only 36.9 per cent. The amount spent for meat and fish and for cereals and grain is more than double that of the above standard. On the other hand the amount spent for meat and dairy products is less than one-fifth of the amount recommended by the nutrition authorities, as shown in Table 11.

TABLE 11.—*Distribution of expenses in the different food groups compared with the well-known standards.*

Source of data.	Cereals and grain.	Milk and dairy products.	Vegetables and fruits.	Fats, sweets, and miscellaneous.	Meat, fish, eggs, etc.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Office of Home Economics	18	15	25	13	29
United States Department Agriculture Thrift Leaflet (1919).	20	20	20	20	20
Sherman standard of low-cost diet	12–15	27–33	15–18	10–15	10–15
Philippine Constabulary	38.9	5.6	13.3	6.8	37.4

PROTECTIVE FOODS IN THE DIET OF THE PHILIPPINE CONSTABULARY

Roxas (1922), in studying the protective foods in the diet of the students' mess at Los Baños, found that they constitute only 10.55 per cent of the diet. Concepcion's (1936) recent findings on the food intake of Filipino college students showed that they constitute only about 6 per cent of the total calories and 19 per cent in relation to the total cost. Sherman recommends that at least as much money be spent for milk and dairy products and for vegetables and fruits as is spent for meat, fish, and poultry. It is very difficult for Filipinos to follow this recommendation on account of the high cost of milk and the low standard of living of the general population. If Sherman's recommendation were followed there would be a deficiency in total calories, although the calcium and the protein content of the diet would be improved. An adequate milk intake in our daily diet is a vital factor in making up our calcium deficiency. Furthermore, milk is rich in vitamins A and D and contains also vitamins B_2 and C, not to mention the adequate protein it contains that will supplement the proteins found in rice. McCallum (1929), in discussing the characteristic attributes of the most satisfactory type of diet, states:

> The first and the most important principle is the extension of the use of dairy products. Instead of the consumption of half a pint of milk a day, there should be about a quart per capita.
>
> The second principle is that there are dietary properties in the leafy vegetables which are unique among foods of vegetables origin. These have been the "protective foods" for many of the Asiatic peoples.
>
> A third principle of great importance in nutrition, viz., that of taking daily certain amount of raw vegetable food to provide a sufficient amount of the antiscorbutic substance. If these simple principles are adhered to,

the main features of an adequate diet will be fulfilled, and the remainder of the food supply may safely be derived from any of our ordinary milled cereal products, tubers, root vegetables, sugar, and meats.

VARIETY IN THE DIET

A study of the variety in the Constabulary diet showed that the average number of articles used in the mess was forty-nine. This is shown in Table 12. It has been estimated that the average American family uses thirty-nine articles each week, while the average Filipino family uses from twenty to thirty articles a week.

The menus given during the time of the survey are sufficiently varied as can be seen in Table 13. I have also included as Table 14 the fifteen days' menus, as proposed by the mess officer, from November 1 to 15, 1935.

SUMMARY AND RECOMMENDATIONS

1. The present ration given to the Philippine Constabulary soldiers is quite sufficient with regard to the total calories and protein but is very deficient in calcium. The proportions of protein, fat, and carbohydrates in the ration compare favorably with the well-known standards. The vitamin-carrying foods are not sufficient for a well-balanced diet.

2. In the distribution of expenses, the amount of money spent for meat, fish, and eggs is almost as large as the amount spent for grain products, which should not be the case. Although meat is one of the good sources of protein, it is poor in calcium and in vitamins. It may be suggested that meats other than those of the muscle type, such as kidney, liver, heart, sweetbreads, and brain, should be used more. They are superior in some respects to the muscle type of meats for they are rich in vitamins A and B, and their use would assist in varrying the diet. The use of pork meat should be more liberalized for it has been shown by Cowgill that it contains plenty of vitamin B_1. This would supplement the deficiency of this vitamin in polished rice which constitutes the bulk of the constabulary ration.

3. The milk in the ration is so small that it barely meets the requirement for use in coffee or cocoa. Milk is a rich source of all the known vitamins and is the only common article of

diet sufficiently rich in calcium to preserve the normal calcium-phosphorus balance. Additional allowance of milk, therefore, is strongly recommended to remedy the marked calcium deficiency in the present diet.

4. The use of fresh fruits should be extended. No fruit other than bananas was being served during the time of the survey. Fresh fruits are in general good sources of vitamins. They tend to preserve the alkali reserve of the blood and, therefore, are a valuable constituent of any balanced ration. Vitamins B and C are contained in appreciable amounts in practically all fruits. Tomatoes, oranges, lemons, and pomelo are excellent sources of the antiscorbutic vitamin C. The amount of fresh fruits in the present ration of the constabulary should be increased.

5. Fresh vegetables of the green leafy type are not given regularly in the diet, probably because of the ignorance of the good dietary properties or the high cost of some of the leafy vegetables in the market. However, there are leafy vegetables that can be procured quite economically, and their use should be encouraged. Pechay, Chinese mustard, alugbati, cabbage, pumpkin, kidney beans, camote leaves, and kangkong can be bought in the local markets at fairly moderate cost and their use should be encouraged. Potatoes and onions should be used more extensively than they are at present. The potato is a cheap source of energy and is acceptable to a large number of people. Onions are rich in vitamin C and contain vitamin B to a somewhat less extent. The use of raw onion in salad and for flavoring should be encouraged as an antiscorbutic measure.

6. While the cost per 1,000 calories is quite low compared with that of the rations of other armies, the percentage distribution of expenses is rather defective. Too much money is spent for meat and fish and too little for dairy products, leafy vegetables, and fruits. A better distribution in the food budget for the different food groups, so that less money will be spent for meat and fish and more for milk, vegetables, and fruits, is urgently recommended. If this cannot be done without reducing the total amount of food in the diet, it is recommended that a 5-centavo per capita increase be made in the actual appropriation in order that the soldiers may get a more-balanced ration.

TABLE 12.—*List of the foodstuffs given to the Philippine Constabulary soldiers.*

Meat and fish:
- Beef.
- Corned beef.
- Chicken.
- Choriso (bacon).
- Pork.
- Shrimps.
- Sardines.
- Bañgos.
- Hasahasa.
- Dalagang bukid.
- Daing (hasahasa).

Eggs:
- Chicken and duck eggs.

Milk:
- Cream.

Butter and other fats:
- Butter.
- Margarine.
- Lard.

Grain products:
- Bread.
- Flour.
- Macaroni.
- Rice.
- Sutangjon.
- Misua.

Vegetables and legumes:
- Green peppers.

Vegetables and legumes—Cont.
- Onions.
- Tomato catsup.
- Potatoes.
- String beans.
- Cabbage.
- Peas.
- Tomatoes.
- Mongos.
- Garbansos.
- Pechay.
- Garlic leaves.
- Kangkong.
- Camote leaves.
- Tamarind.

Nuts:
- Coconuts.

Fruits:
- Bananas.

Sugar:
- Cane sugar.
- Sweet (pionono).

Miscellaneous:
- Cocoa.
- Coffee.
- Garlic.
- Ginger.
- Toyo sauce.
- Pimienta.

TABLE 13.—*Menus of meals given in the Manila Garrison from December 4 to December 10, 1935.*

DECEMBER 4

Breakfast:
- Pan de sal with butter.
- Coffee, cream, and sugar.
- Bananas.

Dinner.—Sutangjon con caldo:
- Boiled rice.
- Chicken.
- Beef.
- Sutangjon.
- Sweet (merengue).

Supper.—Mongo guisado:
- Boiled rice.
- Pork.
- Shrimps.
- Bananas.

DECEMBER 5

Breakfast:
- Boiled rice.
- Sardines.
- Taho with sugar and cream.
- Bananas.

Dinner.—Pochero:
- Boiled rice.
- Beef.
- Choriso.
- Pechay.
- Cabbage.
- Garbansos.
- Sweet (grated coconut).

TABLE 13.—*Menus of meals given, etc.*—Continued.

DECEMBER 5—continued.

Supper.—Fried fish and macaroni soup:
- Boiled rice.
- Fish.
- Macaroni.
- Eggs.
- Bananas.

DECEMBER 6

Breakfast:
- Pan de sal with butter.
- Coffee, cream, and sugar.
- Bananas.

Dinner.—Beef afritada
- Boiled rice.
- Beef.
- Tomatoes.
- Pepper.
- Peas.
- Onions.
- Sweet (pionono).

Supper.—Boiled chicken:
- Boiled rice.
- Chicken.
- Pechay.
- Garlic leaves.
- Onions.
- Toyo.
- Bananas.

DECEMBER 7

Breakfast:
- Pan de sal with butter.
- Coffee, cream, and sugar.
- Bananas.

Dinner.—Quimlo:
- Boiled rice.
- Beef.
- Misua.
- Eggs.
- Sweet (coconut pie).

Supper.—Chop suey:
- Boiled rice.
- Beef.
- Shrimps.
- Cabbage.
- Onions.
- Toyo.
- Bananas.

DECEMBER 8

Breakfast.—Samporado:
- Rice.
- Chocolate.
- Cream.
- Sugar.
- Ensemada.

Dinner.—Pochero:
- Boiled rice.
- Beef.
- Pechay.
- Garbansos.
- Bananas (saba).
- Sweet (grated coconut).

Supper.—Sutangjon con caldo:
- Boiled rice.
- Beef.
- Sutangjon.
- Tinapa.
- Bananas.

DECEMBER 9

Breakfast:
- Pan de sal with butter.
- Coffee, sugar, and cream.
- Bananas.

Dinner.—Sinigang:
- Boiled rice.
- Fish (bañgos).
- Kangkong and camote leaves.
- Sweet (londres).

Supper.—Pork and beans:
- Boiled rice.
- Mongo beans.
- Pork.
- Shrimps.
- Tomatoes.
- Onions.
- Bananas.

DECEMBER 10

Breakfast:
- Pan de sal with butter.
- Coffee, sugar, and cream.
- Bananas.

Dinner.—Afritada:
- Boiled rice.
- Beef.
- Potatoes.
- Peas.

TABLE 13.—*Menus of meals given, etc.*—Continued.

DECEMBER 10—continued.	DECEMBER 10—continued.
Dinner.—Afritada—Continued.	Supper.—Fried fish and macaroni soup—Continued.
Tomatoes.	Fish.
Onions.	Macaroni.
Sweet (pionono).	Eggs.
Supper.—Fried fish and macaroni soup:	Tomatoes.
Boiled rice.	Bananas.

TABLE 14.—*Daily menu proposed for the brigade, by the mess officer, for November 1 to November 15, 1935.*

	Pesos.
FRIDAY, NOVEMBER 1	
Breakfast:	
Four pan de sal with butter	0.035
Coffee, cream, and sugar	0.02
One banana	0.007
Total	0.062
Dinner.—Pancit:	
Rice	0.03
Pork	0.02
Chicken	0.02
Shrimps	0.02
Miqué	0.005
Onions, kinchay, pepper, and toyo	0.01
Bucayo	0.006
Total	0.111
Supper.—Carne guisada:	
Beef	0.04
Lard, onions, and pepper	0.01
Tomatoes, garlic, and toyo	0.007
Pionono	0.006
Total	0.093
Grand total, including fuel	0.296
SATURDAY, NOVEMBER 2	
Breakfast:	
Four pieces pan de leche	0.03
Chocolate, cream, and sugar	0.02
One lakatan banana	0.008
Total	0.058

TABLE 14.—*Daily menu proposed, etc.*—Continued.

SATURDAY, NOVEMBER 2—continued.

	Pesos.
Dinner.—Bañgos sinigang:	
Rice	0.03
Bañgos	0.05
Camote and kangkong leaves	0.007
Tamarind and salt	0.003
Native onion leaves	0.005
Coconut pie	0.006
Total	0.101
Supper.—Pork and beans:	
Rice	0.03
Pork (chopped fine)	0.03
White beans	0.01
Onions, tomatoes, and garlic	0.005
Condol	0.006
Total	0.081
Grand total, including fuel	0.270

SUNDAY, NOVEMBER 3

Breakfast.—Samporado:	
Rice, chocolate, cream, and sugar	0.025
Four pieces ensemada	0.03
Total	0.055
Dinner.—Pork and beef cocido:	
Rice	0.03
Pork	0.02
Beef	0.02
Potatoes, cabbage, and pechay	0.015
Toyo, onions, and spices	0.005
Saba banana	0.006
Sherbet	0.007
Total	0.103
Supper.—Fried fish:	
Rice	0.03
Fish (sea fish)	0.05
Lard	0.01
Tomato ketchup	0.01
No desert	0.00
Total	0.10
Grand total, including fuel	0.298

TABLE 14.—*Daily menu proposed, etc.*—Continued.

MONDAY, NOVEMBER 4

	Peso.
Breakfast:	
Four pieces pan de sal with butter	0.035
Papaya	0.015
Coffee, cream, and sugar	0.02
Total	0.07
Dinner.—Chicken boiled with malungay leaves:	
Rice	0.03
Chicken	0.06
Malungay, onions, and tomatoes	0.01
Tomatoes, garlic, and salt	0.005
No desert	0.00
Total	0.105
Supper.—Sutangjon con caldo:	
Rice	0.03
Pork (chopped fine)	0.015
Shrimps	0.02
Sutangjon, garlic, and onions	0.01
Toyo	0.005
Cake	0.006
Total	0.086
Grand total, including fuel	0.291

TUESDAY, NOVEMBER 5

Breakfast:	
Pan de leche	0.03
Chocolate, cream, and sugar	0.02
Banana lakatan	0.008
Total	0.058
Dinner.—Shrimps sinigang:	
Rice	0.03
Shrimps	0.04
Banana heart (puso) and tamarind	0.015
Native onions and salt	0.005
Peanut candy (bar)	0.006
Total	0.096

TABLE 14.—*Daily menu proposed, etc.*—Continued.

TUESDAY, NOVEMBER 5—continued.

	Peso.
Supper.—Pork with mongos:	
Rice	0.03
Pork (chopped fine)	0.02
Mongos (ground), onions, and salt	0.01
Daing (dried fish) hasahasa	0.02
Lanzones	0.02
Total	0.10
Grand total, including fuel	0.284

WEDNESDAY, NOVEMBER 6

Breakfast:	
Four pieces pan de sal with butter	0.035
Coffee, cream, and sugar	0.02
Toldan banana	0.008
Total	0.063
Dinner.—Boiled fish (pesa):	
Rice	0.03
Sea fish	0.05
Pechay	0.01
Native onions, garlic, and tomatoes	0.005
Coconut pie	0.006
Total	0.101
Supper.—Picadillo:	
Rice	0.03
Beef (ground)	0.04
Spinach	0.006
Lard, onions, and tomatoes	0.01
Panocha	0.006
Total	0.092
Grand total, including fuel	0.286

THURSDAY, NOVEMBER 7

Breakfast:	
Four pieces pan de sal with butter	0.035
Coffee, cream, and sugar	0.02
Papaya	0.015
Total	0.070

TABLE 14.—*Daily menu proposed, etc.*—Continued.

THURSDAY, NOVEMBER 7—continued.

	Peso.
Dinner.—Calamares adobado:	
Rice	0.03
Squids	0.05
Lard	0.01
Banana	0.007
Total	0.097
Supper.—Beef with habichuelas:	
Rice	0.03
Beef	0.04
Habichuelas	0.005
Lard, onions, and toyo	0.01
Cake	0.006
Total	0.091
Grand total, including fuel	0.238

FRIDAY, NOVEMBER 8

Breakfast:	
Pan de leche	0.03
Chocolate, cream, and sugar	0.02
Banana	0.008
Total	0.058
Dinner.—Bijon con caldo:	
Rice	0.03
Pork (chopped fine)	0.02
Shrimps	0.02
Garlic, onions, and tomatoes	0.01
Bijon and toyo	0.01
Rimas	0.005
Total	0.095
Supper.—Chicken (pesa) boiled with sili leaves:	
Rice	0.03
Chicken	0.05
Sili leaves, native onions, and salt	0.01
Lard, tomatoes, and garlic	0.01
No desert	0.00
Total	0.10
Grand total, including fuel	0.234

TABLE 14.—*Daily menu proposed, etc.*—Continued.

SATURDAY, NOVEMBER 9

	Peso.
Breakfast:	
Pan de sal with butter	0.035
Coffee, milk, and sugar	0.02
Banana	0.008
Total	0.063
Dinner.—Kimlo (Chinese dish):	
Rice	0.03
Pork (chopped fine)	0.01
Beef (chopped fine)	0.01
Chicken cut into small pieces	0.02
Shrimps	0.02
Kimlo	0.01
Toyo, onions, and garlic	0.005
No desert	0.00
Total	0.105
Supper.—Carne afritada:	
Rice	0.03
Beef	0.04
Lard, onions, and garlic	0.01
Potatoes and toyo	0.01
No desert	0.00
Total	0.09
Grand total, including fuel	0.288

SUNDAY, NOVEMBER 10

Breakfast.—Samporado:	
Rice, chocolate, cream, and sugar	0.03
Four pieces ensemada	0.03
Total	0.06
Dinner.—Pinacbet:	
Rice	0.03
Pork	0.03
Ampalaya and talong (eggplant)	0.02
Bagoong	0.01
Onions and fresh tomatoes	0.01
Banana	0.008
Total	0.108

TABLE 14.—*Daily menu proposed, etc.*—Continued.

SUNDAY, NOVEMBER 10—continued

	Peso.
Supper.—Chicken curry:	
Rice	0.03
Chicken	0.05
Potatoes, onions, and tomatoes	0.01
Grated coconut	0.01
Condol	0.006
Total	0.106
Grand total, including fuel	0.304

MONDAY, NOVEMBER 11

Breakfast:	
Pan de sal with butter	0.035
Coffee, cream, and sugar	0.02
Banana	0.008
Total	0.063
Dinner.—Shrimps adobado:	
Rice	0.03
Shrimps	0.05
Lard, ketchup, and onions	0.015
Fresh pechay	0.005
Bucayo	0.006
Total	0.106
Supper.—Carne guisada con salza:	
Rice	0.03
Beef (ground)	0.04
Potatoes, onions, and toyo	0.01
Lard, flour, and spices	0.01
No desert	0.00
Total	0.09
Grand total, including fuel	0.289

TUESDAY, NOVEMBER 12

Breakfast:	
Pan de sal with butter	0.035
Coffee, cream, and sugar	0.02
Banana	0.008
Total	0.063

TABLE 14.—*Daily menu proposed, etc.*—Continued.

TUESDAY, NOVEMBER 12—continued.

	Peso.
Dinner.—Boiled beef with seguedillas:	
Rice	0.03
Beef (ground)	0.04
Seguedillas	0.01
Lard, onions, toyo, and salt	0.01
Lanzones	0.02
Total	0.11
Supper.—Pork and beans:	
Rice	0.03
Pork (chopped fine)	0.04
White beans and toyo	0.01
Tomatoes, onions, garlic, and salt	0.007
Pionono	0.006
Total	0.093
Grand total, including fuel	0.296

WEDNESDAY, NOVEMBER 13

Breakfast:	
Pan de leche	0.03
Chocolate, cream, and sugar	0.02
Banana	0.008
Total	0.058
Dinner.—Boiled chicken (pesa):	
Rice	0.03
Chicken	0.05
Pechay, onions, and salt	0.01
Cake with icing	0.006
Total	0.096
Supper.—Fried fish with sauce:	
Rice	0.03
Fish and lard	0.05
Eggs, onions, toyo, and corn starch	0.01
Peanut bar	0.006
Total	0.096
Grand total, including fuel	0.280

TABLE 14.—*Daily menu proposed, etc.*—Continued.

THURSDAY, NOVEMBER 14

	Peso.
Breakfast:	
Pan de sal with butter	0.035
Coffee, cream, and sugar	0.02
Banana	0.008
Total	0.063
Dinner.—Menudencias guisada:	
Rice	0.03
Menudencias (beef)	0.04
Lard, garlic, and onions	0.01
Potatoes, achuete, and canned tomatoes	0.01
No desert	0.00
Total	0.09
Supper.—Pork with mongos:	
Rice	0.03
Pork (chopped fine)	0.02
Shrimps	0.02
Mongos, onions, and tomatoes	0.01
Panocha	0.006
Total	0.086
Grand total, including fuel	0.269

NOVEMBER 15.—INAUGURATION OF THE PHILIPPINE COMMONWEALTH

It is presumed that the inaugural parade will take place in the morning. The men are given a heavy breakfast.

Breakfast:	
Fried rice (rice and lard)	0.035
Four tinapa and salt	0.03
Tabo (ginger and sugar)	0.007
Total	0.072
Dinner.—Pochero:	
Rice	0.03
Pork sausage (chorizo)	0.02
Beef	0.02
Chicken	0.03
Potatoes and cabbage	0.01
Garbanzos, onions, and tomatoes	0.01
Banana (saba), pechay, and salt	0.01
Magnolia ice cream	0.04
Total	0.17

NOVEMBER 15.—INAUGURATION, ETC.—continued.

Supper.—Beef toyoba:	Peso.
Rice	0.03
Beef	0.04
Lard, garlic, and toyo	0.01
Total	0.08
Grand total, including fuel	0.352

This menu (especially with regard to sea fish) is subject to change without notice. The fish market is uncertain, and no one is willing to accept a contract with guarantee.

Following strictly the menu the mess savings per capita during the 15 days' schedule may be summarized as follows:

Date.	Savings.	Losses.
	Peso.	Peso.
November 1	0.004	0.0
November 2	0.03	0.0
November 3	0.002	0.0
November 4	0.009	0.0
November 5	0.016	0.0
November 6	0.014	0.0
November 7	0.012	0.0
November 8	0.016	0.0
November 9	0.012	0.0
November 10	0.00	0.004
November 11	0.011	0.0
November 12	0.018	0.0
November 13	0.006	0.0
November 14	0.031	0.0
November 15	0.00	0.052
Total	* 0.181	0.056

* Per capita net mess savings equals 0.181 less 0.056 or 0.125 centavos.

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BOOKS

Acknowledgment of all books received by the Philippine Journal of Science will be made in this column, from which a selection will be made for review.

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BURROWS, H. R., and T. K. HORSEFIELD. Economics of planning; principles and practice. Philadelphia, Pa., The American academy of political and social science, 1935. 31 pp. Price, $1.50.

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REVIEWS

Physiologie et physiopathologie du Système réticulo-indothélial. Per Albert H. Du Bois. Preface du Prof. M. Roch. Masson et Cie., Paris, 1934. Paper, 204 pp. Price, 36 fr.

The author has done a distinct service to the profession by this elaborate account of the various stages through which the reticulo-endothelial system has passed before it was fairly es-

tablished and accepted. It is undoubtedly due to Aschoff in 1924 that we owe its incorporation into current medical thought as an entity by itself, although as early as 1890 Ranvier had already described his phagocytic clasmatocytes, and may be considered as the precursor of the view, later to prevail, that the connective tissue is not, as was hitherto believed since Virchow's time, a mere supporting tissue, with exclusively mechanistic functions, but has a physiology of its own and important functions to perform, such as the deposition of water and salt in œdema, and the forming of a sort of barrier between the tissues and the circulating blood and the protection of the parenchyma, all of which, when disturbed, give rise to characteristic syndromes.

While there is a tendency at present, in the light of experimental and clinical findings, to extend the term *res* to all the active mesenchyme, the following are specifically considered to be a part of the same:

1. The endothelia of blood and lymph vessels.
2. The fibrocytes.
3. The reticular cells of the spleen, lymph nodes and lymphatic tissue in general.
4. The reticulo-endothelial cells, some sinuses in the lymph nodes, some blood sinuses in the spleen, some capillaries in the hepatic lobules (Kupffercells), some capillaries of the bone marrow, the suprarenal, and the hypophysis.
5. The histiocytes.
6. The splenocytes and monocytes derived from the histiocytes and the reticulo-endothelial cells.

The book is conveniently arranged into three parts. The first part is devoted to an account of the experimental investigations that have gradually led to the establishment of the reticulo-endothelial system; the second part deals with the rôle played by the system in physiology and physiopathology; and the third part is taken up by therapeutics.

A bibliography extending to July, 1933, is appended and will be of much assistance to those who wish further to enlarge their information on some particular phases of the subject. It gives the reader an idea of the tremendous amount of investigative work that has already been done in connection with the reticulo-endothelial system.—C. R.

Dog Encyclopedia; A Complete Reference Work on Dogs. By Will Judy. 2d ed. Judy Publishing Co., Chicago, 1936. xv + 459 pp., illus. Price, $5.

This comprehensive work is a valuable reference to those interested in dogs. The different breeds from the smallest to the largest, from the Chihuahua to the Saint Bernard, are concisely described from the standpoint of origin, development, history, temperament, and utility. An official standard description of the recognized breed appears at the end of each important breed discussed. Descriptions of the wild members of the family Canidæ, such as the coyote, the jackal, and the hyena, are also included. Care, breeding, kenneling, training, and exhibiting of the dog, together with interesting data and lore on canines, collected through the centuries, are some of the other subjects covered. Common diseases are described in a language readily understood even by the ordinary dog fancier.

The book is profusely illustrated. It has no table of contents or index, however, although the different subjects are discussed in alphabetical order. The author has included numerous cross references for the convenience of the reader.—L. M. Y.

Die Fusarien; ihre Beschreibung, Schadwirkung und Bekämpfung. Von Dr. H. W. Wollenweber und Dr. O. A. Reinking. Paul Parey, Berlin, 1935. viii + 355 pp., 95 text figs. Price, in Germany, unbound, Rm. 18; bound, Rm. 20; foreign, unbound, Rm. 13.50; bound, Rm. 15.

Die Fusarien, by Wollenweber and Reinking, deals with fusaria and fusarium diseases. The study of fusaria has long been in a state of confusion, so that few mycologists had the courage to tackle it except in a more or less general way. This publication puts an end to that long period of uncertainty.

The present work consists of two main parts; namely, the systematic study of fusaria by Wollenweber and the fusarium diseases by Reinking. The systematic part represents many years of intensive work. The section on fusarium diseases reveals the experience of the author in plant diseases. Host plants are included and named in alphabetical order and for each is given a description of the fusarium diseases to which it is susceptible, together with a bibliography on these diseases. The hosts range from algæ and fungi to coniferous and broad-leaved trees, including plants of economic importance from temperate

and tropical regions. Control measures, such as hot-water treatment of seeds, and the use of mercurial fungicides and resistant varieties, are included.

This piece of work serves as a key to the solutions of the many problems on fusaria, prepared by workers equipped with special experience as the result of many years of patient and careful labor.—J. M. M.

Economical Cookery. By Elizabeth Craig. Collins, London and Glasgow, 1934. 252 pp. Price, 1 s. net.

This book contains 650 economical recipes especially designed to make the most of inexpensive foods. Unlike Miss Craig's other books, it attempts to meet the problems of even the country housewife, who has storage room of her own and whose chief economy is to use produce from her own garden or foodstuffs which can be procured cheaply in the country.

One of its topics, of great interest to women, is "How to keep slim." Well-balanced reducing menus are set forth. For those who want to reduce but find it quite impossible to follow the diet prescribed, it gives important points to follow daily to cut down weight.

The preparation of a few dishes from cheap ingredients, but attractive enough to set before guests, is described. Home-made drinks, cocktails, and other beverages are included. Several simple menus made from left-overs are presented.

Miss Craig is a cookery expert and a contributor to several journals and magazines dealing with home economics; such as, the Woman's Journal, the Woman Pictorial, the Yorkshire Evening Post, and the Farmer and Stock Breeder. Some of her own publications aside from Economical Cookery are Cooking with Elizabeth Craig, Entertaining with Elizabeth Craig, Elizabeth Craig's Standard Recipes, and Series of Cooking Calendars.—E. G. G.

Oceanic Birds of South America. A Study of Species of the Related Coasts and Seas, Including the American Quadrant of Antarctica, Based upon the Brewster-Sanford Collection in the American Museum of Natural History. By Robert Cushman Murphy. Illustrated from paintings by Francis L. Jacques. Photographs, maps and other drawings. American Museum of Natural History, New York, 1936. Vol. I, xxiv + 640 pp., with plates 1–38, 6 paintings in colors, and text figs. 1–61. Vol. II, pp. 641–1245, plates 39–72, 10 paintings in color, and text figs. 62–80.

In two volumes Doctor Murphy presents the results of his many years of study of the birds of the ocean, from two main

aspects: The physical environment and the oceanic birds themselves.

The continent of South America, the meteorology and hydrology of its coasts, and the influence of these on the avifauna are discussed in a very scholarly manner, under Geographic Background. Under Ornithological Circumnavigation of South America the author describes the main coasts of the continent and the islands about it, and their physical and climatic features, together with their characteristic bird life.

The author presents a systematic account of 183 species and subspecies, belonging to 16 families of 5 orders. The arrangement in Peter's Check-list of the Birds of the World is followed. Under each species or subspecies the following arrangement of annotations is consistently followed: Scientific name, original citation, vernacular names, synonymy, description of the species, description of eggs, distribution, and a general discussion including life history, field observation of collectors, migration, and kindred matters. On certain controversial aspects of the subject the author gives the views held by important specialists, followed by his own opinion, with supporting evidence. The discussions on the phylogeny of the penguin and the identity of steamer ducks of Patagonia are very interesting.

The introduction gives a brief account of the part played in this study by such men as Dr. L. C. Sanford and Mr. F. F. Brewster; a short biography of R. H. Beck, the field worker, is also given.

The work forms one of the most outstanding American contributions to ornithological literature in recent years.—C. G. M.

Aids to the Identification of Anopheline Imagines in Malaya. By B. A. R. Gater. Published by the Government of the Straits Settlements and the Malaria Advisory Board, Federated Malay States. The Secretary, Malaria Advisory Board, Kuala Lumpur: Kelly and Walsh Ltd., 1935. 242 pp., 9 plates, and 235 text figs. Price, $1.

This monograph is regarded by the author as preliminary, subject to revision. Still, however incomplete it may seem, it contains a wealth of information in abridged form, particularly useful to students who are just at the threshold to the intricate and advanced work on anopheline imagines.

Fifty-five species and subspecies of anophelines are presented in the booklet. Of these, forty-one have been recorded in the Malay Peninsula and the rest from neighboring countries in the Malaysian subregion. Fourteen of the species and subspecies presented have been found in the Philippines. These are *Ano-*

pheles annularis, bengalensis, bæzai, barbirostris, insulæflorum, karwari, kochi, leucosphyrus, ludlowi, maculatus, nigerrimus, philippinensis, sinensis, and *tessellatus.*

The classification, table for identification, and illustrations of anopheline imagines are so clearly presented that beginners can easily comprehend them. The anatomy of anopheles adults is extensively dealt with; fine anatomical structures, such as the mouth parts, pharyngeal armature, male and female terminalia, alimentary system, and salivary glands are described. The life history and habits of anophelines are discussed. The discussion of collecting and rearing, of preserving and mounting is comprehensive. However, it might have been well to include a brief description of systematic entomological work on anophelines; that is, the mounting of the adult, with label showing date, place of collection, lot, and number which must correspond to the labels of its larval and pupal skins. The examining, maintaining, and dissecting of anopheline imagines are discussed in a practical way.—A. E.

Mosquitoes of the Ethiopian Region. I.—Larval Economics of Mosquitoes and Taxonomy of Culicine Larvae. By G. H. Hopkins. Sold at The British Museum (Natural History); Bernard Quaritch, Ltd.; Dulau & Co., Ltd.; and the Oxford University press, 1936. 6 unnumbered + 250 pp., 158 text figs. Price, $3.75.

This is a useful reference for those who take up the study of culicines. It is most valuable, of course, to workers in Ethiopia; there are only a few peregrine species included in the text, the descriptions of which may be compared with specimens from other countries. Of such are, at least, *Aëdes* (*Aëdimorphus*) *vexans, Aëdes* (*Banksinella*) *lineatopennis, Aëdes* (*Stegomyia*) *ægypti, Aëdes* (*Stegomyia*) *albopictus, Culex* (*Culex*) *fatigans, Mansonia* (*Mansonioides*) *uniformis,* and *Mucidus mucidus,* which are definitely known to exist in the Philippine Islands. Therefore, it will be very interesting to find out how the local specimens compare with the Ethiopian.

The remarkably well-executed illustrations supplementing the description for each species help to make the text understandable. New terms in mosquitology are introduced and defined.

Of particular value to beginners is the part dealing with the external anatomy of larvæ, in which the author describes and illustrates the structures used in identification. His nomenclature, however, differs in certain respects from that used by Barraud in the Fauna of British India, so that it becomes a little inconvenient if not confusing to those who have already

adopted Barraud's terminology. The author's attempt to differentiate "comb teeth" into "spines" and "scales" may have its uses, but it seems awkward to use "scales" for a larval structure the make-up and function of which are apparently quite different from the true and well-known scales of the adult.

As a whole, the work is excellent, and its companion parts, said to be in preparation, are awaited with interest.—A. E.

We Europeans. By J. S. Huxley and A. C. Haddon. With a contribution by A. M. Carr-Saunders. Harper and Brothers, Publishers, New York and London, 1936. 246 pp. Price, $2.50.

This book deals with racial problems and discusses their relation to nationality. Its purpose is to bring together the chief scientific facts now available on the subject of race and to present them in the light of established scientific principles.

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One of the important conclusions of the authors is the recognition of the extent of our scientific ignorance revealed by an analysis of this fundamental subject.

This valuable reference book is the first of its kind giving scientific treatment of racial problems.—R. E. G.

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